

Shark utilization, marketing and trade

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Food
and
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by
Stefania Vannuccini
FAO Consultant

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PREPARATION OF THE DOCUMENT

The population dynamics of sharks are not well known, in particular their biology and stock assessment, except for certain species. In general many shark species are particularly vulnerable to over-exploitation due to their biological characteristic of low reproductive potential and therefore limited capacity to recover from overfishing. Over the last twenty years the increase in demand for and value of fins and cartilage and the expansion of the market for shark meat have caused a consistent growth of recreational and commercial shark fisheries. At the same time, a growing international concern over the possible effects of this continued exploitation on marine food chains is emerging together with the need for improving the available information on shark species and their utilization. Some species have been classified as endangered and a few governments have implemented protection measures. Interest in a more co-ordinated international action culminated in the adoption of an "International Plan of Action for the conservation and management of sharks" at the FAO Committee on Fisheries (COFI) in February 1999.

The need to collect more information on biological and trade data on shark species has led FAO to undertake various technical studies on sharks and other cartilaginous fish, including their biology and utilization. This document has been prepared in this framework and updates the FAO/UNCTAD/GATT book "Shark utilization and marketing", authors R. Kreuzer and R. Ahmed, issued in 1978. This study is financed under project GCP/INT/643/JPN-Component 5 "Biological and Trade Status of Sharks".

This technical paper provides a comprehensive and timely report on shark products in trade and identifies regional and worldwide trends in demand and supply. It is divided in a world overview, with selected country focuses, written by Ms Stefania Vannuccini, consultant of the FAO Fish Utilization and Marketing Service (FIU), and in various Appendixes that, with the exception of Appendix I, have been written by experts external to FAO. Many interesting sections of these appendixes have been included in the main document, in particular in the chapters describing shark products.

Appendix I reports the International Plan of Action for the conservation and management of sharks that has been approved during the FAO Committee on Fisheries (COFI) in February 1999. The other appendixes have been prepared by different consultants. Ms Sei Poh Chen (Malaysia) is the author of Appendix II which focuses on individual countries, their commercially important shark species and their utilization. In Appendix III Mr Hooi Kok Kuang (Singapore) analyses non-food uses of sharks as cartilage and liver oil. The studies covered under appendix IV are country and regional analysis: Mr Hooi Kok Kuang wrote on Hong Kong, Ms Sei Poh Chen on Singapore and Malaysia, Mr R.A.M. Varma (India) on India, INFOYU on China, Mr Santiago Caro Ros of INFOPESCA on Latin America, Mr Massimo Spagnolo (Italy) on the Mediterranean and Mr O. Abobarin, Mr O.K.L. Drammich and Mr M. Njie on Gambia and Ghana.

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ABSTRACT

Sharks belong to the *Chondrichthyes* class, together with skates, rays and chimaeras and are found throughout the world in a wide variety of habitats and employing many biological strategies. Though sharks make up only a small percentage of the world's recorded fish landings, they are extremely versatile and are a valuable resource. They are of primary importance in some regions of the world, sustaining important fisheries in some countries. Moreover, they have been, and are, a cheap but valuable source of protein for coastal communities dependent on subsistence fisheries. Humans can utilize much of the carcass for food or other uses. Sharks are exploited for their meat, fins, skin, liver, teeth, cartilage and other internal organs.

Shark flesh is used for meat which is highly favoured in some regions, most particularly in Europe with northern Italy and France as the major consuming countries and Spain as the world's largest exporter of shark meat. Meat is a high protein, low fat product, healthy as long as those specimens with a high mercury content are avoided. Shark intestines and skin are also eaten, chiefly in some Asian countries. Shark skin is used to make leather and sandpaper. Shark liver oil is used in the textile and leather industries, as a medicine and health supplement, as an ingredient of cosmetics and as a lubricant. This is not a negligible use of shark as between 2 500 and 3 000 specimens are required to make one tonne of shark liver oil. Production of shark cartilage products is a growing industry in shark processing, as the cartilage is being advocated as a cure for many conditions, particularly those associated with old age but also includes cancer and even AIDS. Even shark teeth and "bones" are made into curios and any discarded parts of the carcass can be made into fishmeal and fertilizer. Shark fin is one of the costliest marine commodities and is used as a soup ingredient in communities of Chinese origin all over the world. China is the world's largest producer and trader in shark fin. Hong Kong appears to have out-sourced much of its processing of shark fin to China, taking advantage of the lower labour costs, however it remains the most important market in shark fin. The world trade figures for shark fin almost certainly include some double counting, as fins are frequently re-exported after further processing. It is surmised that improved techniques in the processing of shark fin, developed because of the exorbitant price of this commodity, have led to a reduction in the amount of raw material required to produce soup. It is interesting to note that the liberal use of salt in the preparation of shark fin, which the Chinese consumers complained about, is recommended in the section on preparation in the appendix IV.3 on the Indian shark industry.

It is not possible to make all these uses of each shark, as the methods of preservation and preparation are often mutually exclusive and not all species of shark are suitable for every application. This report details the species used and the methods of preparation for the various purposes: meat, fins, liver oil, skins, cartilage and other uses. Contributions from East Asia, reported in the Appendixes contain many photographs of the fins traded and identify the species they belong to, using their local names and allocating the scientific name where possible. The nomenclature of shark, not only the common names and the names of processed parts, but even the scientific names, where multiple synonyms exist, only add to the confusion when trying to collect or assess data.

This publication brings together information from those parts of the world where sharks are important economically, as a substantial fisheries sector, a contribution to human food or a valuable trading item, with the latest statistics available, and with those on a world-wide basis from FAO. When comparing published statistics it is noticeable that few individual species are itemized and that there are significant discrepancies between available sources.

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STANDARD SYMBOLS

| | |
|------------------|---|
| - | none |
| 0 | more than zero but less than half the unit used |
| na | not available |
| % | percentage |
| US\$ | US Dollar |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| COFI | FAO Committee on Fisheries |
| China | China, main (excl. Taiwan Province of China and China, Hong Kong Special Administrative Region) |
| EU | European Union |
| Hong Kong | China, Hong Kong Special Administrative Region |
| Taiwan PC | Taiwan Province of China |
| UK | United Kingdom |
| USA | United States of America |

1. INTRODUCTION

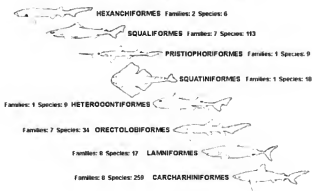
Sharks appeared around 450 million years ago during the Devonian era. Consumption of shark meat has been recorded in literature as early as the fourth century. Persians and Cretans caught and sold sharks some 5 000 years ago in the Persian Gulf and the Mediterranean.

Sharks are a valuable resource. They possess a primary importance in some regions of the world, sustaining important fisheries in some countries. Moreover, they have been, and are, a cheap source of protein for coastal communities dependent on subsistence fisheries. Sharks provide many products that are used by humans. They are exploited for their meat (fresh, frozen, salted or in brine, smoked), fins (one of the most expensive fishery products, used to produce the famous shark fin soup), liver-oil (for cosmetics and pharmaceuticals), skin (for leather and sandpaper), teeth (in jewellery), and, more recently, cartilage (ground to powder and proposed as an "anti-cancer" cure).

2. BIOLOGY

Sharks belong to the class *Chondrichthyes*, together with *rajiformes*, torpedos, sawfish, chimaeras and elephant fish. These fish differ from the *Osteichthyes* or bony fish as they possess a cartilaginous skeleton instead of a bony skeleton. This class is divided by main taxonomists into two subclasses: *Holocephalii* (chimaeras or ratfish and elephant fish) and the *Elasmobranchii*, which include sharks (classified into 35 families and roughly 465 species¹, as can be seen in figure 1) and a group known as the batoids (composed of *rajiformes*, torpedoes and sawfishes). The great majority of the commercially important species of chondrichthyans are elasmobranchs².

Figure 1 Classification of sharks



¹ COMPAGNO L.J.V, new version of the "Sharks of the world catalogue", in preparation for FAO. Expected to be released in late 1999/early 2000. At the time of print (August 1999) the above figures were not yet finalized and the number of shark species has increased to approximately 479.

² BONFIL R., "Overview of world elasmobranch fisheries", FAO Fisheries Technical Paper 341, Rome, 1994.

Sharks and the *Chondrichthyes* in general are not well known in terms of their population dynamics, in particular concerning their biology and stock assessment, except for certain species. The migratory habits of most species have made it difficult for researchers to keep track of individual populations. Moreover, sharks were traditionally considered as low-value commercial fish so no priority was given to collecting data about them and only limited research has been done. The situation has been changing over the last twenty years as the increase in demand for and value of fins and cartilage and the expansion of the market for shark meat have caused a consistent growth of recreational and commercial shark fisheries. At the same time, public interest in ecology and concern about the state of shark resources, considered to be under pressure, has risen.

Shark populations are extremely heterogeneous and are represented by a great variety of species, which differ markedly in habits and biology, in particular in growth and reproduction. They inhabit wide-ranging environments from the bottom of marine oceans to freshwater rivers, lakes, inshore estuaries and lagoons, from polar waters to warm tropical regions. They live in coastal waters, open sea, at different depths, even as low as 2 000 meters. Only 5% are really oceanic. There are species, such as the megamouth shark (*Megachasma pelagios*), which inhabit the ocean depths, while hammerheads (*Sphyrna* spp.) and sandbar sharks (*Carcharhinus plumbeus*) prefer shallow coastal waters. Sharks vary greatly in size from the colossal whale shark (*Rhincodon typus*), which can exceed 12 meters, to the pygmy sharks (*Euprotomicrus bispinatus*), which are full grown at 25cm. Most species are highly migratory and travel great distances, such as mako sharks (*Isurus* spp.), blue shark (*Prionace glauca*) and whitetip shark (*Carcharhinus longimanus*), which are pelagic, but other species are localized. There are species with a limited distribution and those which are widespread. There are also wide differences in their social behaviour: some species are solitary, like the thresher sharks (*Alopius* spp.), but they can assemble when attracted by shoals of prey. There are species that tend to segregate geographically on the basis of age and sex, such as sandbar, blue and dogfish (*Squalidae*). They can live as long as 60/70 years like the tope sharks (*Galeorhinus galeus*), or they can have a shorter lifespan like the roughly 20 years of the blue shark. They can take up to 20-25 years to mature like the dusky shark (*Carcharhinus obscurus*), or mature within one year like the Australian sharpnose shark (*Rhizoprionodon taylori*). Not all sharks are totally carnivorous. There are species such as the whale, basking (*Cetorhinus maximus*) and megamouth sharks which eat predominantly plankton. Shark reproductive strategies also vary widely from one species to another. They can be oviparous, viviparous or ovoviviparous as many species lay eggs, others have placentas, and some produce embryos. The gestation time can be long (two years) and the number of offspring can reach 300 (e.g. the whale shark) or be limited to one (e.g. the sandtiger shark (*Carcharias taurus*)).

In general the life history of sharks is characterized by slow growth rates, low fecundity potential, relatively late sexual maturation, long life spans and so they are classified by ecologists as strong K strategists. Furthermore, they are usually the top predators in their communities and are therefore comparatively sparsely distributed. So, they possess biological peculiarities and an ecological role that indicate that they could be particularly sensitive to an increase in fishing exploitation¹.

There are enormous differences between sharks and other fish. In particular, unlike other vertebrates, sharks have a skeletal structure of cartilage instead of bone. Urea and trimethylamine in their blood and tissues help to maintain their osmotic balance. They are without the usual

¹ BONFIL R., idem.

urinary tract, so they concentrate urea in their blood and excrete it through their skin. Urea is a nitrogenous, non-toxic by-product of protein metabolism, which must be removed by immediate bleeding, dressing and icing the shark after it is caught to prevent urea from contaminating the meat. Urea is converted by bacteria to ammonia and lodges in the tissues. Improper handling causes a strong ammonia odour and taste. Due to urea and ammonia the shelf life of fresh product is limited to a few days.

3. CATCHES

The available data on shark fisheries is considered to be rather limited and questionable. Even if FAO statistics represent the most exhaustive data on world fisheries, it is not possible to determine the exact volume of shark from the total chondrichthyan catches. As can be seen in Table 1, there are problems of species identification and lack of species-specific reporting. Many of the estimated 465 shark species are small, deep-water and seldom met or caught. About 100 species are encountered in commercial fisheries throughout the world. FAO statistics report figures for only 29 species of sharks, from individual species to orders, plus the group of various sharks nei (*Selachimorpha (Pleurotremata)*) FAO data are compiled from information supplied by the fishery agencies of individual countries. National reporting by species is rare and generally occurs only in the few cases where sharks are included in existing management plans. Often countries lump together all shark species or report catches of sharks and batoid fishes within the single category of "*Elasmobranchii* unidentified", or simply provide FAO with summary information from these fisheries. Approximately half of all catches and landings, and the largest increases in landings in recent years, are reported in the category of unidentified *Elasmobranchii*.

According to FAO statistics, chondrichthyans represent only a minor group in terms of catches. In 1997 they accounted for only 0.65% of total world catches and 0.85% of total world captures. Total chondrichthyan catches have grown considerably, from 271 800 tonnes in 1950 to a record of 804 000 tonnes in 1996. This growth was fairly regular, with some periods sluggish (early 1950s and most 1970s) and some sustained increases (1955-73 and 1984-96). In 1997 catches were 789 900 tonnes, a 1.8% decrease as compared to 1996.

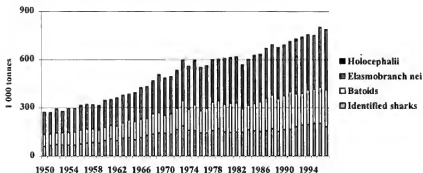
3.1 CATCHES BY SPECIES

It is not possible to know accurately the total world catches of sharks but Bonfil⁴ has estimated that sharks represent 60% of the world elasmobranch catch. In 1997 catches of identified sharks amounted to 181 900 tonnes, a slight decrease as compared to 203 100 tonnes in 1995 but a substantial growth with respect to 59 700 tonnes in 1950. Since 1950 "*Elasmobranchii* not identified" have more than doubled, from 137 400 tonnes to 373 200 tonnes in 1997. Requiem sharks (*Carcharinidae*) and dogfish represent the major shark groups caught, followed by smoothhounds (*Mustelus* spp.). Of the identified species, the greatest volumes are reported for picked dogfish (*Squalus acanthias*), the silky shark (*Carcharhinus falciformis*), and narrownose smoothhound (*Mustelus schmitti*). However, this data shows traces of misleading identifications of species

⁴BONFIL R., *idem*.

by countries. So, unfortunately, there are species reported from only a few of the countries that catch them.

Figure 2 Chondrichthyan catches by species in 1 000 tonnes, 1950-1997



Source: FAO - FIDI

Among species that are usually targeted by directed fisheries are picked dogfish, smoothhounds, shortfin mako shark, thresher shark, porbeagle, dusky shark, silky shark, sandbar shark, Oceanic whitetip shark, blue shark, whitetip reef shark, basking sharks and tope sharks.

Picked dogfish inhabits warm temperate to boreal waters throughout the world and is one of the most typical shark in Northern Atlantic. Fisheries for picked dogfish are quite significant, as this species is particularly appreciated in Europe, mainly in France and Germany. Its meat is marketed fresh, frozen, smoked, boiled-marinated, dried-salted, and in the form of fish cakes for human consumption. This species is also used for liver oil, fishmeal, pet food, fertilizer and leather. According to FAO data, catches of picked dogfish⁵ have substantially increased, from 22 200 tonnes in 1950 to 44 100 tonnes in 1997, with a peak of 57 100 tonnes attained in 1987. US catches for picked dogfish have shown a huge growth in the last few years, from 5 800 tonnes in 1989 to more than 29 600 tonnes in 1996 when 57.3% of all picked dogfish catches were reported to be from the USA. In 1997 US catches were 21 000 tonnes, a 29.1% decrease as compared to 1996. According to FAO, in 1997 the largest proportion of picked dogfish catches was taken in the Northwest Atlantic followed by the Northeast Atlantic and Southwest Pacific. Limited catches occurred in the Northeast Pacific, western Central Atlantic and Mediterranean and Black Sea. In the last decennium, catches of picked dogfish in the Northeast Atlantic have declined considerably, from 43 900 tonnes in 1987 to 13 900 tonnes in 1997. During the same period catches in the Northwest Atlantic grew from 2 750 tonnes to 20 500 tonnes respectively. In the past this species was regarded as under-utilized by the USA and Canada and it became targeted as an alternative to the declining groundfish stocks by the USA, mainly for foreign markets. Nowadays, more than 90% of US exports of shark flesh consist of picked dogfish.

⁵ US catches reported to FAO as dogfish sharks nei have been summed up to those of picked dogfish according to the 18th Northeast Regional Stock Assessment Workshop (NEFSC 1994).

Shortfin mako shark inhabits warm temperate waters throughout all oceans. It is an important shark for fisheries because its meat is considered to be of the highest quality. Moreover, this species is also a prime game fish, prized by sport anglers. Its flesh is marketed fresh, frozen, smoked and dried salted for human consumption; the liver is processed for oil, the fins for shark fin soup, the hides are processed for leather and the jaws and teeth used for ornaments. They are often taken as bycatch and often only the carcasses of this species are retained due to the high prices of their meat. In 1997 their catches were 60 tonnes reported by New Zealand, the USA and Brazil.

Porbeagles are common in deep cold temperate waters of the North Atlantic, South Atlantic and South Pacific oceans⁶. Catches of porbeagles have been particularly important in the North Atlantic and in limited quantities in the Mediterranean. There are reports of catches of porbeagles since the early 1800s⁷ by Scandinavian fishermen. Its meat is particularly appreciated and it is marketed fresh, frozen, and dried salted. Porbeagles are also processed for oil and fishmeal and their fins are used for shark fin soup. According to FAO data, the 1960s represent the peak period for the porbeagle catch with the great bulk of catches coming from the Northwest Atlantic by Norway and the Faeroe Islands. In 1964 catches of porbeagles amounted to 9 400 tonnes. The rest of the catch has been taken in the Northeast Atlantic mainly by Norway, France and Denmark plus limited volumes in the Mediterranean by Malta. In the following years the catch of this species has declined considerably and in 1997 they were 1 740 tonnes. In the last three years Canada has become the leading fishing country for porbeagles with a little over 1 300 tonnes in 1997.

Silky sharks are commonly taken as bycatch in swordfish and tuna fisheries and there are significant fisheries in the Gulf of Mexico and Caribbean Sea but data on their catches is scarce. Only Sri Lanka reported catches for this species to FAO from the western Indian Ocean. Also, dusky sharks are taken as bycatch, and they are important species for coastal shark fisheries for both flesh and fins. Yet only South Africa and the USA reported scanty captures of this species to FAO from the western Indian Ocean and Northwest Atlantic, respectively. The meat of dusky and silky sharks is used fresh, frozen, dried, salted, and smoked for human consumption; hides are processed for leather; fins for shark fin soup and liver oil is extracted for vitamins.

Sandbar shark play an important role in the fisheries of the western North Atlantic, eastern North Atlantic, Western Australia and South China Sea as its flesh and large fins are particularly appreciated and considered of a very high quality. Its flesh is used fresh, frozen, smoked and dried salted for human consumption; the hides are processed for leather and other products; the fins for shark fin soup; and the oil is extracted from its liver. Only the USA has reported small catches of this species to FAO during the years 1988-95.

The basking shark (*Cetorhinus maximus*) is the second largest fish in the world after the whale shark. Basking sharks live near the coast and often "bask" on the surface and so are susceptible to harpoon fisheries. There are reports of catches of basking sharks since the earliest times, off the Norwegian coast, Ireland and Scotland, Iceland, California, Peru, Ecuador, China, and Japan. Its commercial importance has always been especially for its liver, heavy with oil, as

⁶ CASTRO J.I., WOODLEY C.M and BRUDEK R.L. "A preliminary evaluation of the status of shark species", FAO Fisheries Technical Paper 380, 1999.

⁷ GAULD J.A., "Records of porbeagles landed in Scotland, with observations on the biology, distribution and exploitation of the species", Scottish Fisheries Research Report 45. Dept. Ag., Edinburgh, Scotland: 1-15, 1989.

the liver may amount to 10 to 25% of the body weight. Liver oil is the only part that has been used for centuries, and in the past it was used for lamp oil and in the mid-twentieth century as a source of vitamin A. The advent of the low-cost, synthetic vitamin A in the 1950s ended some of these fisheries. Nowadays, fisheries also target basking sharks for their huge fins and they are fished in Norway for export to Japan (27 000kg in 1994). Catches of basking shark have been reported to FAO by Norway, France, New Zealand and Portugal. Norwegian catches peaked at 18 700 tonnes in 1970 and have declined considerably since 1976. In the early 1990s they grew again to nearly 3 700 tonnes to drop to a bit more than 580 tonnes in 1997. Catches of Portugal, France and New Zealand have been rather scanty.

Fisheries for tope sharks occur in particular off Uruguay, Argentina, California, and southern Australia. Its flesh is marketed fresh, frozen, and dried salted; its liver is processed into oil, particularly rich in Vitamin A; and its fins for shark fin soup. Nowadays, there are concerns about the status of their stocks that seem to show signs of depletion off California, Brazil and Argentina. There are documented decreases in their stocks due to heavy exploitation in the 1940s off California. This species has been heavily exploited also off Australia and New Zealand. Management policies for tope sharks exist in Australia and fisheries in Australia and New Zealand have been restricted or have collapsed due to findings of high mercury levels in specimens caught there. New Zealand's catches for tope sharks were particularly sustained in the early 1980s, peaking at 4 950 tonnes in 1984. Since then they declined and were 2 860 tonnes in 1997. France also captured tope sharks, mainly for export to Italy. This catch peaked at 1 700 tonnes in 1983 and has declined subsequently. This decrease was mainly due to findings of high mercury levels and rejection by the Italian market of imports of this species. In 1997 catches of tope sharks were more than 3 300 tonnes and have been reported to FAO by the UK, Denmark and New Zealand, with this latter as the major producer.

Blue shark occurs in tropical, subtropical and temperate waters all over the world and represents one of the major species caught as bycatch. It is usually finned and discarded due to the low value of its meat. Another reason for discarding it is its high urea content which confers a strong taste and odour of ammonia to its flesh. In order to be used for human consumption the meat of blue sharks has to be promptly and correctly processed otherwise, if their carcasses are put on the boats near other more valuable species of fish, such as tuna and swordfish, there is a risk of contaminating them. Their fins have a low market value but they are usually retained as the large quantities of blue sharks caught make up for their low price. Data on discards and landings of blue sharks are scarce. Bonfil⁸ estimated the world bycatch of blue sharks in drift-net and longline high sea fisheries at 6.2-6.5 million fish per year for the level of effort found in the late 1980s and early 1990s. Blue sharks are marketed in the form of fresh, frozen, smoked and dried salted meat, fins are used for shark fin soup, their hides are processed into leather and they are also used for fishmeal and liver oil. In 1997 catches of blue sharks were 520 tonnes and were reported to FAO by France, New Zealand, Denmark and Brazil.

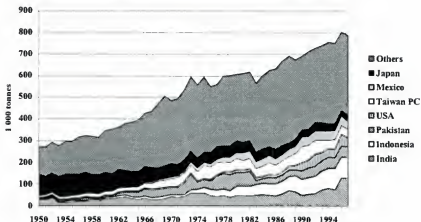
⁸ BONFIL R., *idem*.

3.2 CATCHES BY COUNTRY

Table 2 shows major fishing countries of chondrichthyan species by selected years from 1950 to 1997.

In 1997 India was by far the world's leading chondrichthyan fishing nation, followed by Indonesia, Pakistan, USA, Taiwan Province of China, Mexico and Japan. Other relevant countries, with more than 10 000 tonnes, were Argentina, Spain, Malaysia, France, UK, New Zealand, Sri Lanka, Republic of Korea, Brazil, Thailand and Maldives.

Figure 3 Chondrichthyan catches by countries in 1 000 tonnes, 1950-1997

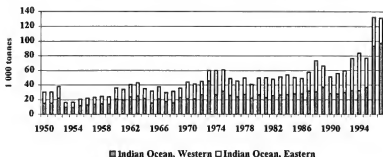


Source: FAO - FIDI.

India has traditionally had an important elasmobranch fishery. In 1950 its catches represented 11.0% of the total world production of chondrichthyans and in 1997 India was the first shark fishing country with nearly 131 400 tonnes, or 16.6% of the world total. Its catches have shown various ups and downs since 1950, with material increases in the mid 1980s, peaking at 132 200 tonnes in 1996. Yet, *Elasmobranchii* represent only 3.6% of total national catches in 1997. Catch composition data are not available as India reports all catches in the group "*Elasmobranchii* not identified". According to the study prepared by Varma⁹ for FAO, the potential resource of *Elasmobranchii* in Indian waters consists in 120 000 tonnes with more than 65 species. Sharks account for about 70% of the Indian *Elasmobranchii*. More than 20 species of sharks are usually captured, mainly *Carcharhinidae* and *Sphyrnidae*. Major species caught are blacktip shark (*Carcharhinus limbatus*), spot-tail shark, whitecheek shark (*Carcharhinus dussumieri*), blacktip reef shark, hardnose shark (*Carcharhinus macroti*), tiger shark (*Galeocerdo cuvier*), spadenose shark (*Scoliodon laticaudus*), milk shark (*Rhizoprionodon acutus*) and scalloped hammerhead.

⁹ VARMA R.A.M., "The Indian shark industry", Appendix IV.3 of this volume.

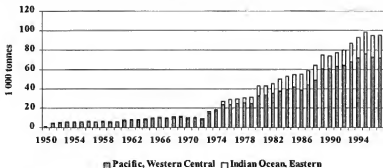
Figure 4 India: chondrichthyan catches by fishing area in 1 000 tonnes, 1950-97



Source: FAO - FIDI.

Indonesia has considerably increased its elasmobranch catch, from 1 000 tonnes in 1950 to 95 600 tonnes in 1997, which represents 12.1% of total world chondrichthyan catches but only 2.6% of total Indonesian catches. This growth has been particularly significant since the mid 1970s. Indonesia does not report chondrichthyan catches by species but only the groups of *Elasmobranchii* and *Rajiformes*, which were respectively 59 450 tonnes and 36 100 tonnes in 1997. According to Bonfil¹⁰, sharks accounted for 66% of the average elasmobranch catches during 1976-91. Among major shark species caught there are blacktip reef shark (*Carcharhinus melanopterus*), spot-tail shark (*Carcharhinus sorrah*), whitetip reef shark (*Triaenodon obesus*), scalloped hammerhead (*Sphyrna lewini*), blue sharks and leafscale gulper shark (*Centrophorus squamosus*).

Figure 5 Indonesia: chondrichthyan catches by fishing area in 1 000 tonnes, 1950-1997



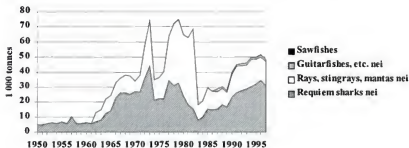
Source: FAO - FIDI.

The chondrichthyan fisheries of Pakistan have shown several ups and downs since 1950. They have increased considerably since 4 800 in 1950 to peak at 74 000 tonnes in 1973 and to

¹⁰ BONFIL R., *idem*.

plummet to 34 800 tonnes in 1974. In the following years they grew again but in 1983 they fell to 18 200 tonnes. Since then catches have steadily increased to more than 51 400 tonnes in 1996. In 1997 they declined to 48 400 tonnes. Nowadays, the great bulk of Pakistanis elasmobranch catches is composed of *Carcharhinidae*, which accounted for 31 200 tonnes in 1997. In the past *Rajiformes* represented the major proportion, with a maximum of 77.4% in 1982.

Figure 6 Pakistan: chondrichthyan catches by species in 1 000 tonnes, 1950-1997



Source: FAO - FIDI.

US elasmobranch catches have increased considerably from 2 600 tonnes in 1950 to more than 40 400 tonnes in 1997, accounting for 5.1% of total world chondrichthyan catches in that year. This growth was not regular, with a tremendous increase since the second half of the 1970s and a peak at 54 100 tonnes in 1992. More information about the US elasmobranch catch can be found in the US section.

In 1997 Taiwan Province of China caught 40 100 tonnes of *Elasmobranchii*, 5.1% of total world chondrichthyan catches. This has substantially increased from 9 000 tonnes in 1950. The growth was particularly significant in the mid 1970s and the mid 1980s, with a peak of 75 700 tonnes in 1990. Since then they have declined sharply, with a slight exception in 1995. In 1997 "*Elasmobranchii* not identified" were 38 700 tonnes and the rest were rajiformes. According to C.T. Chen¹¹, sharks constitute the great bulk of the chondrichthyan catches of Taiwan Province of China. Major species caught are shortfin mako shark, bigeye thresher shark, pelagic thresher shark, smooth hammerhead (*Sphyrna zygaena*), scalloped hammerhead (*Sphyrna lewini*), sandbar shark, silky shark, dusky shark and blue shark.

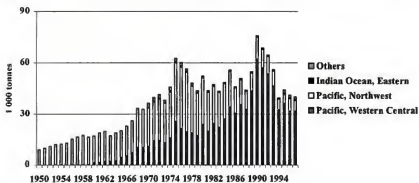
Mexican elasmobranch catches have increased appreciably from 3 600 tonnes in 1954 to 45 200 tonnes in 1996, which represents the peak year. This rise was fairly regular with periods of sustained growth in the mid 1970s and during the last few years. In 1997 catches have declined to 35 700 tonnes, a 21.1% decrease as compared to the previous year. In 1997 Mexican catches of *Elasmobranchii* represented 2.4% of total Mexican catches and 4.5% of total world catches of chondrichthyans. Directed fisheries exist mainly for sharks and they are mostly artisanal, multispecies and multigear¹². Requiem sharks nei are the only shark species identified in FAO

¹¹ CHEN C.T., National Taiwan Province of China Ocean University, pers. comm., 1992

¹² BONFIL R., idem.

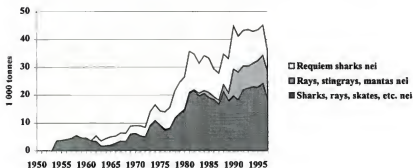
statistics and were nearly 7 300 tonnes in 1997. According to different sources, the main species caught are *Carcharhinidae*, as silky, dusky, blacktip, blacknose and sandbar sharks; *Sphyrnae*, as scalloped and great hammerheads; *Alopiidae* as pelagic and bigeye threshers; smooth-hounds; shortfin and longfin mako sharks.

Figure 7 Taiwan PC: chondrichthyan catches by fishing area in 1 000 tonnes, 1950-1997



Source: FAO - FIDI.

Figure 8 Mexico: chondrichthyan catches by species in 1 000 tonnes, 1950-1997



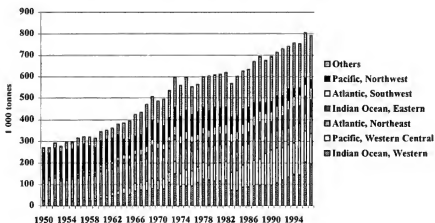
Source: FAO - FIDI.

Until 1971 Japan was the major shark fishing country. The 1940s and 1950s were the periods of the most intensive catches. In 1950 Japan's chondrichthyan catch amounted to 100 700 tonnes, equivalent to 37% of world catches. By 1997 this was down to 3.9%. In 1997 its catch equalled 31 000 tonnes, a 28.0% increase over 24 200 tonnes in 1996. More information on the Japanese elasmobranch catch can be found in the Japanese section.

3.3 CATCHES BY FISHING AREA

In Table 3 chondrichthyan catches are summarized by FAO fishing areas from 1950 to 1997. In 1997 Western Indian Ocean was the major fishing area for chondrichthyans, followed by Western Central Pacific, Northeast Atlantic, Eastern Indian Ocean, Southwest Atlantic, Northwest Atlantic, Northwest Pacific and Eastern Central Pacific. The most relevant growth in catches during the 1950-97 period took place in FAO fishing areas of the Indian Ocean, the Northwest Atlantic and the Western Central Pacific. On the other hand, a decline in catches was registered in the Southeast and Southwest Pacific, and in the Northeast Atlantic. The following sections provide brief overviews of chondrichthyan fisheries in the main fishing areas.

Figure 9 Chondrichthyan catches by fishing area in 1 000 tonnes, 1950-1997



Source: FAO - FIDI.

3.3.1 Western Indian Ocean

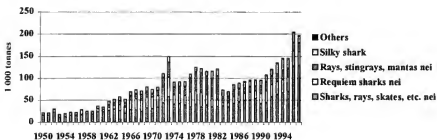
In 1997 western Indian Ocean was the world top fishing area for chondrichthyans. These catches have grown appreciably from 21 300 tonnes in 1950 to more than 196 600 tonnes in 1997. The increase was particularly significant in the 1960s and 1970s, reaching 125 000 tonnes in 1978. Since then catches have fluctuated and fell to 69 700 tonnes in 1984. From 1985 they recovered steadily to reach a record of 204 300 tonnes in 1996.

In 1997 the major fishing nations in this area were India (97 000 tonnes), Pakistan (48 400 tonnes), Sri Lanka (20 000 tonnes) and Maldives (10 600 tonnes).

Requiem sharks represent the major identified shark species caught in this area, followed by silky sharks. In 1997 unidentified *Elasmobranchii* amounted to 129 200 tonnes. Captures of requiem sharks have grown considerably from 4 800 tonnes in 1950 to 31 200 tonnes in 1997. The increase was particularly remarkable in the early 1970s, to peak at a record of 43 800 tonnes in

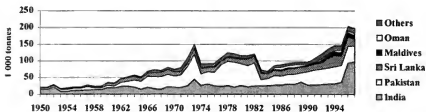
1973. In the following years these catches fluctuated, plummeting to 8 100 tonnes in 1983. Since then, with a few exceptions, catches have recovered even if they have not reached the previous levels. Catches of silky sharks have substantially increased in the past few years peaking at 25 400 tonnes in 1994. In 1997 they were 15 000 tonnes.

Figure 10 Western Indian Ocean: chondrichthyan catches by species in 1 000 tonnes, 1950-1997



Source: FAO-FIDI

Figure 11 Western Indian Ocean: chondrichthyan catches by countries in 1 000 tonnes, 1950-1997



Source: FAO-FIDI

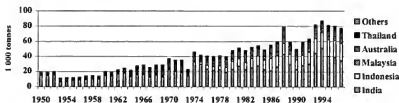
3.3.2 Eastern Indian Ocean

Chondrichthyan catches have also grown remarkably in the Eastern Indian Ocean, from 18 600 tonnes in 1950 to 77 700 tonnes in 1997. The rise was particularly noticeable in the 1990s, with a growth of 75% from 1990 to 1994.

In 1997 major fishing nations in this area were India (34 400 tonnes), Indonesia (23 500 tonnes), Malaysia (6 500 tonnes), Australia (6 300 tonnes), and Thailand (5 600 tonnes).

Smooth-hounds nei and liveroil sharks are the only identified shark groups, with 3 700 tonnes and 760 tonnes, respectively, in 1997.

Figure 12 Eastern Indian Ocean: chondrichthyan catches by countries in 1 000 tonnes, 1950-1997



Sources: FAO – FIDI.

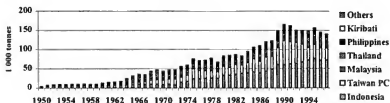
3.3.3 Western Central Pacific

In the period 1984-95 Western Central Pacific was the world top fishing area for chondrichthyans. These catches have increased considerably from 4 200 tonnes in 1950 to 139 800 tonnes in 1997, which was a slight decrease as compared to 1996. The growth was particularly significant since 1970 and catches peaked at 164 900 tonnes in 1990.

Indonesia represents the main fishing nation in this area with 72 050 tonnes in 1997, followed by Taiwan Province of China with 31 700 tonnes and Malaysia with 18 200 tonnes. Indonesia has increased its fishing efforts for chondrichthyans in this area since the 1970s, with consistent growth in the 1990s and a peak of 76 200 tonnes in 1995. Catches of Taiwan Province of China showed a remarkable growth in the mid 1980s, peaking at 62 000 tonnes in 1990. Since then they have declined appreciably to reach 31 700 tonnes in 1996. Other important countries fishing in this area are Thailand and Philippines.

Liveroil sharks (*Galeorhinus* spp.) are the main identified sharks caught with 6 700 tonnes in 1997, reported by Malaysia only. These catches have substantially increased in the 1990s. “*Elasmobranchii* not identified” were at 83 700 tonnes in 1997. The rest of the catch consisted of *Rajiformes*.

Figure 13 Western Central Pacific: chondrichthyan catches by countries in 1 000 tonnes, 1950-1997

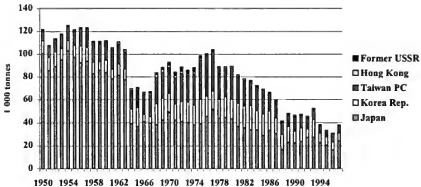


Sources: FAO – FIDI.

3.3.4 Northwest Pacific

Northwest Pacific was until 1960 the top ranking fishing area for chondrichthyans. Catches in this area have substantially decreased from 121 700 tonnes in 1950 to 38 100 tonnes in 1997. This decline has been particularly significant since the late 1970s, corresponding with the decline of Japanese elasmobranch catches. Japan is the main fishing nation in this area and the great bulk of its elasmobranch catches traditionally come from here. Japanese chondrichthyan catches in this area have declined from 100 700 tonnes in 1950 to 24 100 tonnes in 1997, which was an increase over 16 600 tonnes in 1996. In 1997 other important fishing nations were Republic of Korea (7 200 tonnes) and Taiwan Province of China (6 300 tonnes). In 1997, 68.5% of the chondrichthyan catches in this area were unidentified *Elasmobranchii*.

Figure 14 Northwest Pacific: chondrichthyan catches by countries in 1 000 tonnes, 1950-1997



Source: FAO-FIDI.

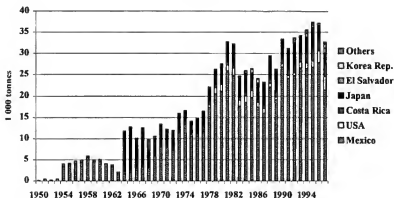
3.3.5 Eastern Central Pacific

Catches of chondrichthyans in the Eastern Central Pacific have increased remarkably from 70 tonnes in 1950 to a peak of 37 500 tonnes in 1995. There has been a sustained increase in production since 1978. In 1997 they were 32 700 tonnes, which was a slight decrease as compared to 1996.

In 1997 Mexico was by far the main fishing nation for *Elasmobranchii* in this area with 21 400 tonnes. Other important countries were the USA (3 200 tonnes), Costa Rica (2 800 tonnes) and Japan (2 700 tonnes).

Requiem sharks represent the main shark species recorded in this area but they are identified by Mexico only. In 1997 these catches were 3 500 tonnes. In the same year 340 tonnes of dogfish sharks *nei* were captured by French Polynesia. In 1997, 72.6% of the catches were unidentified *Elasmobranchii*.

Figure 15 Eastern Central Pacific: chondrichthyan catches by countries in 1 000 tonnes, 1950-1997



Source: FAO - FIDL

3.3.6 Northwest Atlantic

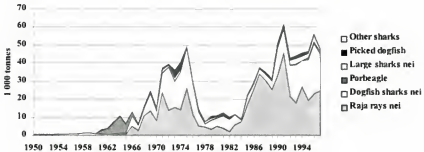
Chondrichthyan catches in Northwest Atlantic have shown an impressive rise from 600 tonnes in 1950 to 48 100 tonnes in 1997. This increase has not been regular. There was sustained growth until the mid 1970s, reaching 49 300 tonnes in 1975, followed by a considerable decline to 7 600 tonnes in 1978. In the following years there was a series of strong oscillations and a recovery in production with a record 61 400 tonnes in 1991.

The USA is the major fishing nation in this area, accounting for more than 65% of the total chondrichthyan catch in 1997 with 31 300 tonnes. In the same year other important countries in this area were Spain (9 500 tonnes), Canada (6 300 tonnes) and Portugal (900 tonnes in 1997, but 23 300 tonnes in 1991). From the mid 1960s to mid 1970s the former USSR was the largest fishing nation in this area, accounting for more than 90% of the catch.

Among the identified species, *Squalidae* represents the major group with 20 300 tonnes of dogfish sharks *nei*¹³, 450 tonnes of pickled dogfish and 1 300 tonnes of large sharks *nei* (*Squaliformes*) in 1997. Porbeagles (1 340 tonnes in 1997) are also important. Other identified species are nurse sharks *nei* (*Ginglymostoma spp.*), shortfin mako (*Isurus oxyrinchus*), sandbar shark, pelagic thresher, longfin mako (*Isurus paucus*) and dusky shark.

¹³The US catches reported to FAO as *squalidae* are very close to those of pickled dogfish reported by the 18th Northeast Regional Stock Assessment Workshop (NEPSC 1994).

Figure 16 Northwest Atlantic: chondrichthyan catches by species in 1 000 tonnes, 1950-1997



Source: FAO - FIDI.

3.3.7 Northeast Atlantic

Chondrichthyan catches have slightly decreased from 80 300 tonnes in 1950 to 78 100 tonnes in 1997. This decline was not regular. Catches increased from 1950 to 125 700 tonnes in 1961. In the following years they exhibited limited fluctuations peaking at 127 700 tonnes in 1969. Since then they continued to fluctuate, with a more marked downward trend since 1988.

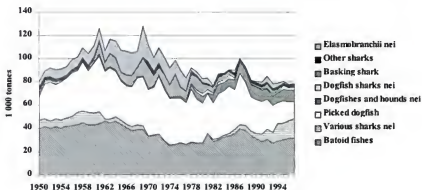
In 1997 France was the main fishing nation in the Northeast Atlantic with nearly 22 500 tonnes followed by UK with 21 400 tonnes and Spain with 15 000 tonnes. Other important countries were Portugal (6 000 tonnes), Ireland (5 100 tonnes) and Norway (2 800 tonnes). Norwegian fisheries have substantially varied since 1950 with an increasing trend up to 1963, when they peaked at 45 800 tonnes. Since then they have been several fluctuations with a consistent decline from 1981. There was a recovery in the early 1990s when they reached 12 300 tonnes in 1991.

Catches of picked dogfish have commonly accounted for the largest part of the total chondrichthyan catch in this area. In 1950 they were at 20 300 tonnes and they substantially increased in the following years up to 1960. Since then they declined to recover from a trough in the mid 1960s to peak at 49 400 tonnes in 1972. Catches declined again, with the exception of 1978, followed by an upward trend in the mid 1980s. Since the high of 43 900 tonnes in 1987 this fishery has declined considerably to 13 900 tonnes in 1997. UK represents the main fishing nation for this species with 8 700 tonnes in 1997, followed by France (1 700 tonnes), Norway (1 600 tonnes) and Ireland (1 400 tonnes). Nearly 2 400 tonnes of other not identified dogfish sharks were captured in 1997. This fishery was quite significant in the early 1950s, between 1979 and 1985 and in the last few years. The group dogfish and catsharks (*Squalidae*, *Scyliorhinidae*) is very important with 10 300 tonnes in 1997 of which 7 800 tonnes were from France, 1 400 tonnes from Portugal, 660 tonnes from UK and 430 tonnes from Belgium. These catches began to be noteworthy in 1978 and peaked at 11 200 tonnes in 1988.

Another important group is represented by "various sharks nei", with Spain, UK and Portugal as major fishing nations. These catches were prominent in the 1950s and in the last few

years when they peaked at 16 900 tonnes in 1997. Important fisheries for basking sharks existed in the 1960s, and they peaked at 18 700 tonnes in 1970. They fluctuated in the following years, reaching a low of 110 tonnes in 1995. In 1997 they were at 580 tonnes, with Norway as major fisher. Limited captures of these species are also reported from Portugal and France. Catches of porbeagles were relevant in the early 1950s and 1970s, peaking at 4 400 tonnes in 1971. They markedly declined in the following years with a recovery in the late 1970s. In 1997 they were at 380 tonnes with France and Denmark representing the main fishers. Catches of blue sharks have been reported from 1978 when they were only 4 tonnes. They have increased in the last few years, peaking at 360 tonnes in 1994. In 1997 they were 290 tonnes, nearly all from French vessels.

Figure 17 Northeast Atlantic: chondrichthyan catches by species in 1 000 tonnes, 1950-1997



Source: FAO - FIDI

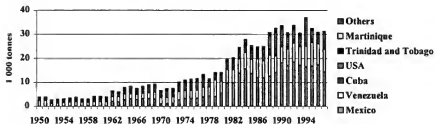
3.3.8 Western Central Atlantic

Chondrichthyan fisheries in this area, which includes the Gulf of Mexico, the Caribbean, the east coast of Central America and the north coast of South America, have grown from 3 900 tonnes in 1950 to 31 250 tonnes in 1997. The increase was particularly substantial in the 1980s.

Mexico is the main fishing nation operating in this area, with 14 300 tonnes in 1997, followed by Venezuela with 9 700 tonnes, Cuba with 3 300 tonnes and the USA with 3 100 tonnes. Mexican catches have increased markedly since the early 1980s.

Requiem sharks are the main shark species caught in this area with nearly 11 400 tonnes in 1997, of which 7 600 tonnes were from Venezuela and 3 800 tonnes from Mexico. These catches showed a substantial growth in the early 1980s but since then they have been fairly stable with few fluctuations. In 1997 other shark species recorded were smooth-hounds nei (27 tonnes) and dogfish (310 tonnes).

Figure 18 Western Central Atlantic: chondrichthyan catches by countries in 1 000 tonnes, 1950-1997



Source: FAO-FIDI

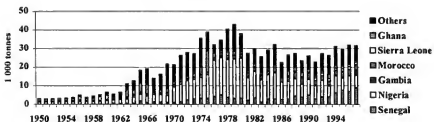
3.3.9 Eastern Central Atlantic

Catches of chondrichthyans have increased substantially from 3 000 tonnes in 1950 to 31 700 tonnes in 1997. This increase has been particularly significant in the 1960s and 1970s, peaking at 42 900 MT in 1979.

In 1997 Senegal was the main fishing nation in this area with 9 000 tonnes, followed by Nigeria (6 600 tonnes), Gambia (3 200 tonnes), Morocco (2 600 tonnes), Sierra Leone (1 400 tonnes) and Portugal (1 390 tonnes).

Large sharks nei represent the main shark species identified in this area with 1 350 tonnes in 1997. In 1997 Mauritania was the leading fisher with 1 070 tonnes, followed by the Republic of Congo (280 tonnes) and Greece (2 tonnes). In the same year 51 tonnes of smooth-hounds nei were captured by Portugal and Greece and 12 tonnes of scalloped hammerhead by Guinea-Bissau.

Figure 19 Eastern Central Atlantic: chondrichthyan catches by countries in 1 000 tonnes, 1950-1997



Source: FAO-FIDI

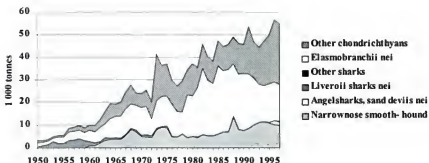
3.3.10 Southwest Atlantic

Catches of chondrichthyans in this area, which includes the entire eastern coast of South America, have shown an impressive increase, growing from 3 200 tonnes in 1950 to 54 900 tonnes in 1997. This growth was fairly regular, accelerating from the mid 1960s.

In the last few years Argentina has substantially increased its catches of elasmobranch in this area, becoming the leading fishing nation with 29 000 tonnes in 1997, followed by Brazil with 14 700 tonnes. In this year other important countries were Republic of Korea (5 100 tonnes) and Uruguay (4 900 tonnes).

Narrownose smooth-hound is the main shark species identified, with 9 960 tonnes in 1997 captured by Argentina. This fishery was first recorded at 900 tonnes in 1960 and has increased substantially since then, showing various fluctuations and peaking at 13 600 tonnes in 1988. In 1997 other shark species caught were angelsharks and sand devils (1 560 tonnes), blue sharks (110 tonnes), liveroil sharks (103 tonnes) and shortfin mako (20 tonnes).

Figure 20 Southwest Atlantic: chondrichthyan catches by species in 1 000 tonnes, 1950-1997



Source: FAO-FIDI.

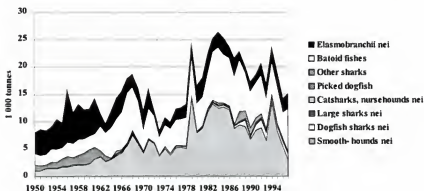
3.3.11 Mediterranean and Black Sea

Chondrichthyan fisheries in this area have grown from 8 100 tonnes in 1950 to 15 200 tonnes in 1997. Production was variable and peaked at 26 400 tonnes in 1984. The early 1980s represent a period of sustained growth. In the last few years there has been a substantial decline from 23 100 tonnes in 1994 to 14 400 tonnes in 1996.

Italy is the main fishing country operating in this area, catching nearly 6 000 tonnes in 1997, a substantial decline from 12 400 tonnes in 1994. Italian catches showed notable increases in production during 1984-86 and in 1994. In 1997 other important countries were Turkey (2 080 tonnes), Greece (1 700 tonnes), Tunisia (1 900 tonnes), Egypt (1 600 tonnes) and Tunisia (1 050 tonnes).

Smooth-hounds represent the main shark species caught in this area. In 1997 they were at 3 000 tonnes of which 1 700 tonnes were from Turkey and 620 tonnes from Italy. Catches of smooth-hounds have shown several ups and downs, peaking at 14 400 tonnes in 1979 and with a marked decline in the last two years. Dogfish are also fairly important with 95 tonnes of picked dogfish and 1 070 tonnes of other dogfish in 1997. In the same year other relevant shark species were large sharks nei at 240 tonnes, catsharks and nursehounds (*Scyliorhinus* spp.) 118 tonnes, angelshark and sand devils (*Squatina*) with 35 tonnes, angelshark (*Squatina squatina*) 34 tonnes.

Figure 21 Mediterranean and Black Sea: chondrichthyan catches by countries in 1 000 tonnes, 1950-1997



Source: FAO - FIDI.

Table 1 World chondrichthyan landings by species in tonnes

| SCIENTIFIC NAME | ENGLISH NAME | 1950 | 1955 | 1960 | 1965 | 1970 | 1975 |
|-------------------------------------|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <i>Alapias vulpinus</i> | Thresher | - | - | - | - | 0 | 0 |
| <i>Carcharhinidae</i> | Requiem sharks nei | 6 800 | 8 300 | 8 300 | 18 800 | 31 900 | 30 510 |
| <i>Carcharhinus falciformis</i> | Silky shark | - | - | 5 000 | 8 000 | 9 400 | 9 800 |
| <i>Carcharhinus limbatus</i> | Blacktip shark | - | - | - | - | - | - |
| <i>Carcharhinus abscurus</i> | Dusky shark | - | - | - | - | 0 | 0 |
| <i>Carcharhinus plumbeus</i> | Sandbar shark | - | - | - | - | 0 | 0 |
| <i>Cetorhinus maximus</i> | Basking shark | 2 700 | 600 | 2 200 | 6 300 | 18 700 | 18 352 |
| <i>Dalatis licha</i> | Kitefin shark | - | - | - | - | - | - |
| <i>Etmapterus spp.</i> | Lanternsharks nei | - | - | - | - | - | - |
| <i>Galeorhinus galeus</i> | Tope shark | 100 | 200 | 300 | 400 | 900 | 522 |
| <i>Galeorhinus spp.</i> | Liveroil sharks nei | 1 500 | 3 000 | 2 900 | 2 100 | 2 700 | 3 700 |
| <i>Ginglymostoma spp.</i> | Nurse sharks nei | - | - | - | - | 0 | 0 |
| <i>Isurus axyrinchus</i> | Shortfin mako | - | - | - | - | 0 | 0 |
| <i>Isurus paucus</i> | Longfin mako | - | - | - | - | 0 | 0 |
| <i>Lamna nasus</i> | Porbeagle | 3 200 | 1 600 | 2 400 | 5 633 | 4 505 | 660 |
| <i>Lamnidae</i> | Mackerel sharks, porbeagles nei | - | - | - | - | 0 | 0 |
| <i>Mustelus schmitti</i> | Narrownose smooth-hound | - | - | 900 | 3 800 | 5 100 | 9 000 |
| <i>Mustelus spp.</i> | Smooth-hounds nei | 2 400 | 4 100 | 9 500 | 10 300 | 17 600 | 18 222 |
| <i>Prianaeae glauca</i> | Blue shark | - | - | - | - | 0 | 0 |
| <i>Scyliorhinus spp.</i> | Catsharks, nursehounds nei | - | - | - | - | 0 | 0 |
| <i>Selachimorpha(Pleurotremata)</i> | Various sharks nei | 7 000 | 6 900 | 10 400 | 3 400 | 300 | 189 |
| <i>Somniosus microcephalus</i> | Greenland shark | - | 0 | - | 100 | - | 60 |
| <i>Sphyrna lewini</i> | Scalloped hammerhead | - | - | - | - | - | - |
| <i>Sphyrna zygaena</i> | Smooth hammerhead | - | - | - | - | - | - |
| <i>Squalidae</i> | Dogfish sharks nei | 14 545 | 9 309 | 8 749 | 6 367 | 7 710 | 24 939 |
| <i>Squalidae, Scyliorhinidae</i> | Dogfishes and hounds nei | 100 | - | 200 | 900 | 500 | 480 |
| <i>Squaliformes</i> | Large sharks nei | 1 000 | 1 300 | 2 500 | 1 000 | 1 662 | 1 461 |
| <i>Squalus acanthias</i> | Pieked dogfish | 20 300 | 34 000 | 42 900 | 34 510 | 39 600 | 40 546 |
| <i>Squatina squatina</i> | Angelshark | - | - | - | - | 0 | 0 |
| <i>Squatinaidae</i> | Angelsharks, sand devils nei | 100 | - | 200 | - | 700 | 344 |
| <i>Myliobatidae</i> | Eagle rays | - | - | - | - | - | - |
| <i>Raja batis</i> | Blue skate | - | - | - | - | 0 | 0 |
| <i>Raja clavata</i> | Thornback ray | - | - | - | - | 0 | 0 |
| <i>Raja fullonica</i> | Shagreen ray | - | - | - | - | 0 | 0 |
| <i>Raja mantagui</i> | Spotted ray | - | - | - | - | 0 | 0 |
| <i>Raja naevus</i> | Cuekoo ray | - | - | - | - | 0 | 0 |
| <i>Raja axyrinchus</i> | Longnosed skate | - | - | - | - | 0 | 0 |
| <i>Raja spp.</i> | Raja rays nei | 40 573 | 42 247 | 43 147 | 44 825 | 41 784 | 52 502 |
| <i>Rajiformes</i> | Rays, stingrays, mantas nei | 12 947 | 17 817 | 24 455 | 54 300 | 55 100 | 94 637 |
| <i>Dasyatis akajei</i> | Whip stingray | 20 000 | 18 700 | 14 200 | 10 300 | 10 200 | 7 684 |
| <i>Rhinobatidae</i> | Guitarfishes, etc. nei | - | - | - | - | 0 | 0 |
| <i>Rhinabatos percellens</i> | Chola guitarfish | - | 100 | 400 | 300 | 900 | 1 800 |
| <i>Rhinabatos planiceps</i> | Pacific guitarfish | - | - | - | 500 | 1 700 | 626 |
| <i>Tarpeda spp.</i> | Torpedo rays | - | - | - | - | 0 | 0 |
| <i>Pristidae</i> | Sawfishes | - | - | - | 900 | 400 | 1 274 |
| <i>Elasmobranchii</i> | Sharks, rays, skates, etc. nei | 137 448 | 146 472 | 165 230 | 179 513 | 233 030 | 276 076 |
| <i>Callarhinichus capensis</i> | Cape elephantfish | - | - | - | - | 0 | 0 |
| <i>Callarhinichus spp.</i> | Elephantfishes nei | 1 100 | 1 500 | 2 100 | 2 100 | 1 500 | 2 030 |
| <i>Halacephali</i> | Chmaeras, etc. nei | - | - | - | - | - | - |
| Grand total | Grand total | 271 813 | 296 145 | 345 981 | 394 348 | 485 891 | 595 414 |

Table 1 World chondrichthyan landings by species in tonnes (continued)

| SCIENTIFIC NAME | ENGLISH NAME | 1980 | 1985 | 1988 | 1989 | 1990 | 1991 |
|--------------------------------------|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <i>Alpias vulpinus</i> | Thresher | 0 | 0 | 21 | 17 | 12 | 16 |
| <i>Carcharhinidae</i> | Requiem sharks nei | 39 621 | 33 021 | 36 375 | 35 034 | 44 165 | 44 482 |
| <i>Carcharhinus falciformis</i> | Silky shark | 10 600 | 11 300 | 12 500 | 12 685 | 11 450 | 13 770 |
| <i>Carcharhinus limbatus</i> | Blacktip shark | - | 0 | 0 | 0 | 0 | 0 |
| <i>Carcharhinus obscurus</i> | Dusky shark | 0 | 0 | 1 | 4 | 70 | 47 |
| <i>Carcharhinus plumbeus</i> | Sandbar shark | 0 | 0 | 2 | 0 | 0 | 0 |
| <i>Cetorhinus maximus</i> | Basking shark | 8 027 | 3 156 | 228 | 1 278 | 1 932 | 1 623 |
| <i>Dalatias licha</i> | Kitefin shark | - | - | - | - | - | - |
| <i>Etmopterus</i> spp. | Lanternsharks nei | - | - | - | - | - | - |
| <i>Galeorhinus galeus</i> | Tope shark | 1 949 | 4 753 | 3 017 | 2 889 | 2 989 | 2 915 |
| <i>Galeorhinus</i> spp. | Liveroil sharks nei | 3 727 | 5 100 | 4 852 | 4 302 | 4 207 | 5 764 |
| <i>Ginglymostoma</i> spp. | Nurse sharks nei | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Isurus oxyrinchus</i> | Shortfin mako | 0 | 0 | 2 | 7 | 19 | 64 |
| <i>Isurus paucus</i> | Longfin mako | 0 | 0 | 0 | 2 | 1 | 5 |
| <i>Lamna nasus</i> | Porbeagle | 1 599 | 677 | 825 | 904 | 1 233 | 1 076 |
| <i>Lamnidae</i> | Mackerel sharks, porbeagles nei | 0 | 0 | 0 | 0 | 1 | - |
| <i>Mustelus schmitti</i> | Narrownose smooth-hound | 5 108 | 6 099 | 13 597 | 8 096 | 7 610 | 8 547 |
| <i>Mustelus</i> spp. | Smooth-hounds nei | 21 136 | 26 059 | 26 179 | 25 812 | 16 996 | 14 612 |
| <i>Prionace glauca</i> | Blue shark | 20 | 43 | 92 | 85 | 137 | 194 |
| <i>Scyliorhinus</i> spp. | Catsharks, nursehounds nei | 0 | - | - | 49 | 103 | 87 |
| <i>Selachimorpha (Pleurotremata)</i> | Various sharks nei | 101 | 2 281 | 4 512 | 3 888 | 4 453 | 6 038 |
| <i>Somniosus microcephalus</i> | Greenland shark | 48 | 46 | 19 | 31 | 54 | 58 |
| <i>Sphyrna lewini</i> | Scalloped hammerhead | - | - | - | - | - | - |
| <i>Sphyrna zygaena</i> | Smooth hammerhead | - | - | - | - | - | - |
| <i>Squalidae</i> | Dogfish sharks nei | 10 608 | 9 593 | 5 965 | 7 621 | 17 294 | 17 687 |
| <i>Squalidae, Scyliorhinidae</i> | Dogfishes and hounds nei | 5 926 | 6 661 | 11 181 | 10 360 | 10 530 | 9 797 |
| <i>Squaliformes</i> | Large sharks nei | 528 | 3 715 | 1 959 | 2 063 | 1 994 | 2 790 |
| <i>Squalus acanthias</i> | Picked dogfish | 39 717 | 44 340 | 48 311 | 37 045 | 38 711 | 35 438 |
| <i>Squatina squatina</i> | Angels shark | 0 | - | - | 14 | - | 10 |
| <i>Squatinaidae</i> | Angels sharks, sand devils nei | 503 | 763 | 697 | 398 | 233 | 152 |
| <i>Myliobatidae</i> | Eagle rays | 8 | 9 | 3 | 9 | 4 | 5 |
| <i>Raja batis</i> | Blue skate | 259 | 326 | 356 | 376 | 391 | 321 |
| <i>Raja clavata</i> | Thornback ray | 1 951 | 3 417 | 2 970 | 2 553 | 2 608 | 2 618 |
| <i>Raja fullonica</i> | Shagreen ray | 0 | 89 | 63 | 88 | 112 | 75 |
| <i>Raja montagui</i> | Spotted ray | 0 | 939 | 943 | 896 | 933 | 998 |
| <i>Raja naevus</i> | Cuckoo ray | 493 | 5 835 | 5 145 | 5 283 | 4 984 | 4 353 |
| <i>Raja oxyrinchus</i> | Longnosed skate | 0 | 71 | 94 | 143 | 162 | 265 |
| <i>Raja</i> spp. | Raja rays nei | 30 848 | 42 090 | 60 758 | 51 715 | 57 745 | 67 358 |
| <i>Rajiformes</i> | Rays, stingrays, mantas nei | 120 770 | 103 711 | 125 491 | 131 768 | 134 258 | 148 505 |
| <i>Dasyatis akajei</i> | Whip stingray | 11 882 | 6 577 | 6 637 | 5 350 | 5 492 | 4 778 |
| <i>Rhinobatidae</i> | Guitarfishes, etc. nei | - | 30 | 1 245 | 1 116 | 1 172 | 1 245 |
| <i>Rhinobatos percellens</i> | Chola guitarfish | 2 510 | 2 239 | 1 118 | 1 146 | 1 100 | 1 125 |
| <i>Rhinobatos planiceps</i> | Pacific guitarfish | 926 | 1 413 | 3 033 | 715 | 539 | 218 |
| <i>Tarpeda</i> spp. | Torpedo rays | 0 | 6 | 4 | 14 | 18 | 19 |
| <i>Pristidae</i> | Sawfishes | 1 311 | 746 | 693 | 741 | 774 | 726 |
| <i>Elasmobranchii</i> | Sharks, rays, skates, etc. nei | 284 199 | 297 052 | 308 492 | 314 779 | 312 684 | 309 828 |
| <i>Callorhynchus capensis</i> | Cape elephantfish | 237 | 848 | 603 | 684 | 546 | 537 |
| <i>Callorhynchus</i> spp. | Elephantfishes nei | 4 176 | 3 226 | 4 753 | 5 560 | 5 211 | 5 233 |
| <i>Holocephali</i> | Chimaeras, etc. nei | - | - | - | - | - | - |
| Grand total | Grand total | 608 788 | 626 231 | 692 736 | 675 520 | 692 927 | 713 379 |

Table 1 World chondrichthyan landings by species in tonnes (continued)

| SCIENTIFIC NAME | ENGLISH NAME | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--------------------------------------|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <i>Alopias vulpinus</i> | Thresher | 105 | 14 | 23 | 16 | 13 | 24 |
| <i>Carcharhinidae</i> | Requiem sharks nei | 46 791 | 48 320 | 48 465 | 51 049 | 52 492 | 46 135 |
| <i>Carcharhinus falciformis</i> | Silky shark | 13 700 | 21 800 | 25 400 | 21 400 | 21 000 | 15 000 |
| <i>Carcharhinus limbatus</i> | Blacktip shark | 0 | 0 | 0 | 0 | 0 | 1 |
| <i>Carcharhinus obscurus</i> | Dusky shark | 69 | 23 | 20 | - | 0 | 7 |
| <i>Carcharhinus plumbeus</i> | Sandbar shark | 55 | 31 | 24 | 1 | - | - |
| <i>Cetorhinus maximus</i> | Basking shark | 3 658 | 2 910 | 1 763 | 123 | 416 | 582 |
| <i>Dalatis licha</i> | Kitefin shark | - | - | - | 303 | 175 | 352 |
| <i>Etmopterus</i> spp. | Lanternsharks nei | - | - | - | 3 | - | 2 |
| <i>Galeorhinus galeus</i> | Tope shark | 2 819 | 2 938 | 2 998 | 4 085 | 3 449 | 3 332 |
| <i>Galeorhinus</i> spp. | Liveroil sharks nei | 7 298 | 6 524 | 6 964 | 8 541 | 8 171 | 7 586 |
| <i>Ginglymostoma</i> spp. | Nurse sharks nei | 0 | 0 | - | 214 | - | - |
| <i>Isurus oxyrinchus</i> | Shortfin mako | 59 | 71 | 66 | 38 | 76 | 60 |
| <i>Isurus paucus</i> | Longfin mako | 12 | - | 5 | - | 0 | 1 |
| <i>Lamna nasus</i> | Porbeagle | 1 215 | 1 129 | 1 087 | 2 129 | 1 504 | 1 736 |
| <i>Lamnidae</i> | Mackerel sharks, porbeagles nei | - | - | 49 | 1 | - | - |
| <i>Mustelus schmitti</i> | Narrownose smooth-hound | 10 094 | 11 070 | 11 450 | 11 057 | 10 252 | 9 956 |
| <i>Mustelus</i> spp. | Smooth-hounds nei | 20 799 | 18 540 | 20 217 | 20 109 | 15 894 | 14 458 |
| <i>Prionace glauca</i> | Blue shark | 277 | 329 | 358 | 398 | 662 | 516 |
| <i>Scyliarhinus</i> spp. | Catsharks, nursehounds nei | 87 | 78 | 24 | 48 | 36 | 118 |
| <i>Selachimorpha (Pleurotremata)</i> | Various sharks nei | 8 361 | 9 523 | 14 421 | 14 578 | 14 552 | 16 932 |
| <i>Somniosus microcephalus</i> | Greenland shark | 68 | 50 | 43 | 55 | 61 | 73 |
| <i>Sphyrna lewini</i> | Scalloped hammerhead | - | - | 2 | 12 | 12 | 12 |
| <i>Sphyrna zygaena</i> | Smooth hammerhead | - | - | - | 12 | 10 | 3 |
| <i>Squalidae</i> | Dogfish sharks nei | 21 544 | 26 035 | 24 092 | 28 956 | 34 178 | 26 728 |
| <i>Squalidae, Scyliarhinidae</i> | Dogfishes and hounds nei | 8 641 | 7 790 | 8 281 | 9 946 | 10 278 | 10 291 |
| <i>Squaliformes</i> | Large sharks nei | 3 744 | 4 656 | 3 913 | 3 861 | 5 463 | 2 879 |
| <i>Squatula acanthias</i> | Picked dogfish | 32 594 | 31 178 | 25 621 | 25 540 | 22 128 | 23 043 |
| <i>Squatina squatina</i> | Angels shark | 10 | 53 | 18 | 35 | 18 | 34 |
| <i>Squatina</i> spp. | Angels sharks, sand devils nei | 127 | 244 | 269 | 613 | 2 235 | 2 074 |
| <i>Myliobatidae</i> | Eagle shark | 5 | 4 | 3 | 2 | 1 | 2 |
| <i>Raja battis</i> | Blue skate | 266 | 254 | 249 | 285 | 340 | 313 |
| <i>Raja clavata</i> | Thornback ray | 2 255 | 1 754 | 1 584 | 1 749 | 1 784 | 1 772 |
| <i>Raja fullonica</i> | Shagreen ray | 88 | 79 | 71 | 75 | 66 | 66 |
| <i>Raja mantagui</i> | Spotted ray | 1 172 | 1 127 | 959 | 925 | 980 | 983 |
| <i>Raja naevus</i> | Cuckoo ray | 3 676 | 3 058 | 3 371 | 3 762 | 4 076 | 4 084 |
| <i>Raja oxyrinchus</i> | Longnosed skate | 393 | 396 | 354 | 359 | 349 | 354 |
| <i>Raja</i> spp. | Raja rays nei | 46 583 | 41 056 | 52 499 | 44 349 | 50 242 | 52 274 |
| <i>Rajiformes</i> | Rays, stingrays, mantas nei | 142 190 | 140 501 | 148 437 | 156 034 | 160 600 | 162 926 |
| <i>Dasyatis akajei</i> | Whip stingray | 4 585 | 4 247 | 4 041 | 3 985 | 4 029 | 3 959 |
| <i>Rhinobatidae</i> | Guitarfishes, etc. nei | 1 441 | 1 520 | 1 562 | 1 288 | 1 535 | 1 550 |
| <i>Rhinabatos percellens</i> | Chola guitarfish | 1 110 | 1 110 | 1 110 | 162 | 404 | 400 |
| <i>Rhinabatos planiceps</i> | Pacific guitarfish | 42 | 89 | 0 | 121 | 460 | 333 |
| <i>Tarpeda</i> spp. | Torpedo rays | 15 | 22 | 23 | 20 | 20 | 17 |
| <i>Pristidae</i> | Sawfishes | 692 | 722 | 718 | 23 | 0 | 48 |
| <i>Elasmobranchii</i> | Sharks, rays, skates, etc. nei | 335 082 | 346 197 | 341 316 | 331 910 | 371 152 | 373 229 |
| <i>Callorhynchus capensis</i> | Cape elephantfish | 542 | 983 | 262 | 386 | 366 | 484 |
| <i>Callorhynchus</i> spp. | Elephantfishes nei | 6 779 | 4 896 | 4 760 | 4 203 | 4 474 | 5 128 |
| <i>Halocephali</i> | Chimaeras, etc. nei | - | - | - | 5 | 49 | 5 |
| Grand total | Grand total | 729 043 | 741 321 | 756 892 | 752 766 | 804 002 | 789 862 |

Source: FAO - FIDI.

Table 2 World chondrichthyan landings by country in tonnes

| COUNTRY | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| India | 30 000 | 30 000 | 38 000 | 15 900 | 16 000 | 20 400 | 21 900 | 23 100 | 24 300 | 23 500 | 35 600 | 33 600 | 40 800 | 43 000 | 34 900 | 31 400 |
| Indonesia | 1 000 | 4 800 | 5 500 | 5 600 | 5 900 | 6 100 | 6 200 | 6 100 | 6 200 | 5 900 | 6 100 | 7 900 | 8 200 | 8 500 | 8 800 | 9 900 |
| Pakistan | 4 800 | 4 800 | 5 700 | 6 300 | 5 700 | 6 800 | 5 600 | 10 200 | 5 500 | 5 700 | 6 600 | 5 500 | 12 800 | 14 600 | 22 000 | 24 200 |
| USA | 2 613 | 2 757 | 3 258 | 3 135 | 2 922 | 2 745 | 3 339 | 3 846 | 4 369 | 4 478 | 2 795 | 2 818 | 2 403 | 2 356 | 3 048 | 2 860 |
| Taiwan PC | 9 000 | 10 000 | 11 000 | 12 100 | 12 300 | 12 900 | 15 200 | 16 500 | 17 400 | 16 500 | 17 100 | 18 900 | 19 700 | 17 200 | 18 800 | 20 100 |
| Mexico | - | - | - | 3 600 | 3 800 | 3 800 | 4 100 | 4 500 | 5 600 | 4 600 | 4 700 | 3 600 | 5 400 | 3 500 | 4 400 | 5 100 |
| Japan | 100 700 | 85 700 | 89 100 | 94 700 | 102 900 | 97 200 | 92 600 | 93 800 | 82 900 | 86 000 | 83 900 | 78 300 | 81 500 | 77 400 | 69 600 | 68 200 |
| Argentina | 1 000 | 1 100 | 1 600 | 2 900 | 2 400 | 2 200 | 3 800 | 4 100 | 4 800 | 4 000 | 3 400 | 2 900 | 3 900 | 6 200 | 6 900 | 7 200 |
| Spain | 10 800 | 11 600 | 10 100 | 10 800 | 10 900 | 10 800 | 11 700 | 14 100 | 14 200 | 15 400 | 14 100 | 14 300 | 10 800 | 11 200 | 13 600 | 11 400 |
| Malaysia | 2 500 | 2 500 | 2 500 | 2 500 | 2 500 | 2 500 | 2 500 | 2 500 | 2 500 | 2 500 | 3 000 | 3 200 | 3 200 | 4 300 | 4 700 | 4 700 |
| France | 17 600 | 18 600 | 20 400 | 22 200 | 21 900 | 22 100 | 28 300 | 23 600 | 24 500 | 24 500 | 26 300 | 27 300 | 26 300 | 28 100 | 29 900 | 34 900 |
| UK | 29 400 | 35 300 | 35 100 | 32 800 | 31 800 | 32 600 | 30 900 | 33 300 | 33 400 | 31 200 | 29 340 | 28 014 | 23 423 | 23 478 | 25 716 | 24 750 |
| New Zealand | 1 000 | 1 100 | 1 000 | 900 | 1 400 | 1 300 | 1 500 | 1 800 | 1 900 | 2 000 | 2 000 | 2 000 | 2 300 | 2 100 | 2 000 | 2 200 |
| Sri Lanka | 500 | 500 | 600 | 700 | 3 100 | 2 500 | 3 000 | 3 900 | 4 300 | 4 300 | 8 100 | 8 500 | 10 300 | 12 100 | 11 200 | 9 800 |
| Korea Rep. | 11 500 | 11 500 | 13 000 | 10 500 | 9 200 | 10 800 | 14 700 | 12 200 | 10 200 | 7 600 | 10 900 | 8 700 | 9 900 | 9 400 | 12 600 | 16 500 |
| Brazil | 1 500 | 1 500 | 1 500 | 1 500 | 2 500 | 2 600 | 4 100 | 4 200 | 4 200 | 4 500 | 5 200 | 5 900 | 7 600 | 8 800 | 10 600 | 9 500 |
| Thailand | 2 000 | 2 000 | 2 000 | 2 200 | 2 300 | 1 600 | 1 600 | 3 100 | 2 700 | 2 800 | 4 300 | 4 000 | 4 500 | 5 100 | 5 800 | 12 400 |
| Maldives | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Venezuela | 2 500 | 2 500 | 1 200 | 1 300 | 1 500 | 1 800 | 2 000 | 1 800 | 1 700 | 1 900 | 2 000 | 1 900 | 2 000 | 2 200 | 2 300 | 2 000 |
| Canada | 300 | 700 | 500 | 500 | 800 | 400 | 200 | 400 | 300 | 800 | 500 | 800 | 100 | 100 | 1 200 | 500 |
| Senegal | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Australia | 2 000 | 2 000 | 2 800 | 3 500 | 3 900 | 2 100 | 1 900 | 2 300 | 2 300 | 2 000 | 2 300 | 2 100 | 2 400 | 3 100 | 3 000 | 4 800 |
| Portugal | 3 100 | 2 400 | 2 300 | 3 000 | 2 200 | 2 200 | 2 800 | 2 100 | 2 000 | 2 400 | 2 200 | 2 200 | 2 200 | 2 500 | 2 600 | 5 000 |
| Peru | 1 300 | 1 100 | 2 500 | 3 100 | 4 500 | 2 500 | 3 300 | 3 500 | 3 400 | 4 200 | 7 200 | 3 700 | 5 300 | 5 100 | 6 100 | 7 600 |
| Oman | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Nigeria | 1 300 | 1 300 | 1 300 | 1 300 | 1 500 | 1 500 | 1 500 | 1 500 | 1 500 | 1 500 | 2 000 | 1 800 | 2 100 | 2 200 | 3 300 | 3 400 |
| Italy | 2 500 | 2 500 | 3 000 | 3 500 | 3 500 | 3 800 | 4 000 | 4 000 | 3 900 | 3 800 | 3 800 | 4 300 | 3 700 | 3 800 | 4 600 | 5 000 |
| Yemen | 1 000 | 1 000 | 1 600 | 1 600 | 1 600 | 2 000 | 1 200 | 1 000 | 1 000 | 1 200 | 1 000 | 1 000 | 1 000 | 1 000 | 1 000 | 800 |
| Norway | 12 000 | 14 400 | 15 300 | 15 500 | 18 800 | 19 100 | 22 800 | 20 900 | 27 100 | 22 000 | 30 000 | 48 424 | 41 016 | 51 563 | 45 660 | 32 345 |
| Others | 19 900 | 19 600 | 21 300 | 19 700 | 21 100 | 21 800 | 25 700 | 24 500 | 27 700 | 29 400 | 31 546 | 29 722 | 28 098 | 30 157 | 29 772 | 35 993 |
| Total | 271 813 | 271 257 | 292 158 | 277 735 | 296 722 | 296 145 | 316 439 | 322 846 | 319 869 | 314 678 | 345 981 | 351 878 | 361 440 | 379 554 | 384 596 | 394 348 |

Table 2 World chondrichthyan landings by country in tonnes (continued)

| COUNTRY | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| India | 37 400 | 29 600 | 31 100 | 35 400 | 44 100 | 41 300 | 45 200 | 60 000 | 60 056 | 60 976 | 49 107 | 45 587 | 49 850 | 40 949 | 49 656 | 50 012 |
| Indonesia | 10 800 | 10 100 | 10 900 | 11 800 | 10 100 | 10 300 | 9 200 | 16 300 | 18 481 | 26 961 | 28 719 | 29 485 | 30 337 | 31 401 | 42 855 | 43 174 |
| Pakistan | 32 800 | 36 100 | 38 000 | 37 700 | 34 300 | 38 000 | 57 100 | 74 000 | 34 792 | 36 554 | 40 340 | 64 129 | 71 948 | 74 691 | 64 975 | 62 898 |
| USA | 2 742 | 2 614 | 1 600 | 1 531 | 1 700 | 1 500 | 1 000 | 1 800 | 2 241 | 1 717 | 4 055 | 4 725 | 5 880 | 11 058 | 11 221 | 10 956 |
| Taiwan PC | 22 900 | 26 000 | 33 200 | 32 700 | 36 300 | 39 700 | 41 400 | 38 100 | 45 787 | 62 440 | 59 968 | 56 383 | 48 061 | 43 688 | 52 260 | 43 656 |
| Mexico | 5 300 | 6 500 | 6 300 | 8 900 | 9 100 | 9 600 | 8 400 | 14 100 | 16 544 | 14 332 | 13 998 | 15 645 | 21 542 | 24 633 | 26 551 | 35 690 |
| Japan | 71 700 | 68 100 | 56 500 | 59 700 | 61 800 | 53 200 | 52 200 | 49 400 | 45 715 | 46 198 | 52 882 | 59 714 | 51 181 | 53 010 | 54 298 | 49 041 |
| Argentina | 7 700 | 10 100 | 13 700 | 10 800 | 8 700 | 10 600 | 9 900 | 13 700 | 14 300 | 13 947 | 10 582 | 9 618 | 12 478 | 9 966 | 11 261 | 8 289 |
| Spain | 11 500 | 10 900 | 11 100 | 9 900 | 9 900 | 11 400 | 11 400 | 0 | 600 | 1 016 | 745 | 149 | 3 667 | 924 | 2 052 | 2 392 |
| Malaysia | 6 400 | 7 000 | 6 500 | 5 900 | 6 600 | 6 400 | 6 700 | 7 800 | 8 204 | 8 499 | 12 189 | 12 224 | 13 708 | 11 861 | 10 855 | 11 452 |
| France | 36 300 | 33 100 | 27 400 | 39 100 | 28 200 | 25 200 | 25 700 | 27 365 | 25 582 | 23 931 | 26 664 | 23 289 | 27 813 | 31 943 | 35 026 | 42 033 |
| UK | 24 474 | 25 561 | 25 825 | 23 800 | 22 400 | 26 305 | 26 635 | 25 952 | 23 847 | 26 638 | 26 735 | 27 442 | 27 195 | 23 936 | 21 355 | 19 808 |
| New Zealand | 2 200 | 2 000 | 2 000 | 2 000 | 2 600 | 3 100 | 2 400 | 2 600 | 3 519 | 3 047 | 4 351 | 5 310 | 4 152 | 4 377 | 6 590 | 7 332 |
| Sri Lanka | 9 600 | 13 900 | 12 700 | 14 800 | 12 500 | 9 800 | 11 500 | 17 900 | 15 700 | 13 055 | 15 610 | 11 312 | 12 569 | 12 830 | 14 170 | 21 265 |
| Korea Rep. | 6 300 | 5 600 | 18 000 | 18 900 | 16 300 | 14 800 | 18 200 | 19 300 | 18 874 | 22 452 | 18 647 | 17 381 | 18 193 | 18 995 | 18 029 | 21 521 |
| Brazil | 10 600 | 13 000 | 12 500 | 11 400 | 12 600 | 12 600 | 8 200 | 25 500 | 19 393 | 19 819 | 16 037 | 15 222 | 14 722 | 21 906 | 23 321 | 25 848 |
| Thailand | 12 800 | 8 000 | 12 300 | 18 800 | 11 400 | 12 500 | 14 400 | 13 600 | 13 700 | 12 104 | 11 439 | 12 198 | 9 775 | 9 349 | 9 456 | 10 189 |
| Maldives | - | - | - | - | 300 | 400 | 1 000 | 500 | 1 000 | 1 000 | 800 | 2 000 | 2 500 | 2 000 | 2 800 | 1 500 |
| Venezuela | 2 100 | 2 200 | 2 400 | 2 900 | 2 600 | 2 700 | 2 800 | 3 600 | 3 267 | 3 597 | 3 469 | 4 137 | 3 853 | 6 920 | 5 041 | 5 408 |
| Canada | 700 | 700 | 900 | 400 | 600 | 900 | 500 | 5 700 | 2 348 | 1 554 | 2 713 | 4 769 | 5 700 | 8 564 | 7 809 | 3 831 |
| Senegal | 800 | 1 300 | 1 200 | 1 000 | 900 | 1 300 | 2 400 | 3 000 | 3 284 | 3 307 | 4 230 | 5 120 | 3 777 | 3 285 | 3 282 | 2 238 |
| Australia | 5 300 | 6 100 | 6 100 | 7 200 | 7 800 | 7 400 | 7 400 | 3 000 | 4 309 | 2 897 | 4 505 | 6 856 | 7 996 | 7 541 | 9 405 | 9 517 |
| Portugal | 3 700 | 5 300 | 4 200 | 5 800 | 1 900 | 2 500 | 2 100 | 2 700 | 2 237 | 3 756 | 3 911 | 2 435 | 3 235 | 4 095 | 4 499 | 4 499 |
| Peru | 9 900 | 19 600 | 24 700 | 14 700 | 19 000 | 11 300 | 10 500 | 21 500 | 16 735 | 14 591 | 10 676 | 13 848 | 15 585 | 13 827 | 13 277 | 19 133 |
| Oman | - | - | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nigeria | 3 600 | 4 000 | 4 000 | 3 700 | 8 300 | 9 400 | 10 200 | 10 400 | 11 219 | 12 520 | 19 391 | 19 915 | 20 312 | 20 905 | 21 476 | 11 940 |
| Italy | 6 000 | 4 800 | 4 700 | 4 500 | 4 800 | 5 000 | 5 400 | 4 600 | 5 061 | 4 771 | 5 608 | 5 631 | 4 826 | 4 535 | 5 124 | 3 911 |
| Yemen | 800 | 1 200 | 1 200 | 1 200 | 1 300 | 1 400 | 1 600 | 1 600 | 2 229 | 2 333 | 3 564 | 3 071 | 3 282 | 3 151 | 1 772 | 1 360 |
| Norway | 28 473 | 26 900 | 32 869 | 42 263 | 43 546 | 29 750 | 35 887 | 33 514 | 30 777 | 35 925 | 24 873 | 21 960 | 21 520 | 19 979 | 15 572 | 8 948 |
| Others | 52 631 | 53 493 | 67 261 | 79 954 | 66 245 | 98 187 | 104 871 | 99 154 | 109 220 | 114 861 | 76 158 | 61 288 | 84 709 | 83 949 | 65 204 | 74 181 |
| Total | 425 520 | 433 768 | 469 155 | 506 748 | 485 891 | 494 442 | 534 193 | 596 685 | 559 021 | 595 414 | 551 811 | 562 319 | 599 566 | 603 408 | 608 788 | 612 062 |

Table 2 World chondrichthyan landings by country in tonnes (continued)

| COUNTRY | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| India | 47 758 | 51 442 | 54 000 | 50 470 | 49 094 | 57 850 | 73 495 | 66 281 | 51 230 | 55 925 | 59 730 | 76 604 | 83 689 | 77 078 | 132 160 | 131 362 |
| Indonesia | 45 019 | 49 877 | 52 764 | 54 536 | 55 087 | 58 887 | 63 982 | 74 907 | 73 272 | 76 827 | 80 139 | 87 138 | 92 776 | 98 098 | 94 691 | 95 550 |
| Pakistan | 68 802 | 18 243 | 20 852 | 29 502 | 27 366 | 28 634 | 30 324 | 27 633 | 40 043 | 45 098 | 45 745 | 46 405 | 50 177 | 49 964 | 51 432 | 48 429 |
| USA | 11 708 | 12 393 | 9 338 | 11 906 | 12 092 | 15 204 | 17 169 | 20 445 | 34 576 | 35 510 | 54 093 | 38 074 | 37 789 | 37 554 | 52 043 | 40 425 |
| Taiwan PC | 47 244 | 43 459 | 48 491 | 55 768 | 45 994 | 50 756 | 43 899 | 54 790 | 75 731 | 68 632 | 64 512 | 56 080 | 39 457 | 44 064 | 41 158 | 40 089 |
| Mexico | 34 641 | 31 433 | 34 113 | 33 310 | 29 397 | 27 903 | 34 610 | 33 114 | 44 880 | 41 169 | 43 267 | 43 603 | 42 922 | 43 470 | 45 205 | 35 665 |
| Japan | 47 580 | 43 698 | 45 682 | 39 435 | 44 412 | 42 877 | 28 616 | 33 904 | 32 103 | 33 362 | 38 466 | 38 539 | 34 318 | 31 146 | 24 206 | 30 995 |
| Argentina | 12 808 | 9 517 | 10 162 | 15 267 | 16 113 | 15 342 | 21 141 | 16 513 | 16 687 | 17 628 | 18 915 | 18 933 | 23 651 | 25 332 | 30 169 | 28 987 |
| Spain | 6 303 | 6 116 | 5 704 | 13 718 | 15 771 | 22 022 | 16 682 | 21 413 | 14 163 | 14 578 | 9 946 | 11 617 | 20 912 | 17 966 | 19 064 | 24 879 |
| Malaysia | 11 165 | 11 230 | 13 512 | 13 328 | 15 388 | 13 877 | 16 194 | 13 678 | 17 360 | 17 161 | 20 771 | 20 898 | 20 889 | 24 144 | 24 004 | 27 765 |
| France | 32 801 | 39 171 | 33 961 | 33 143 | 36 378 | 36 634 | 34 400 | 27 406 | 26 439 | 26 024 | 24 705 | 23 198 | 22 277 | 21 613 | 22 084 | 22 539 |
| UK | 18 346 | 18 517 | 20 899 | 22 816 | 21 340 | 25 681 | 24 523 | 22 161 | 21 776 | 20 690 | 23 412 | 19 692 | 18 358 | 22 155 | 21 335 | 21 443 |
| New Zealand | 8 025 | 9 721 | 10 834 | 10 355 | 7 566 | 8 496 | 11 234 | 9 708 | 10 108 | 9 809 | 9 617 | 14 171 | 12 717 | 14 840 | 12 127 | 21 235 |
| Sri Lanka | 20 121 | 19 154 | 14 717 | 15 113 | 15 543 | 16 083 | 16 710 | 16 958 | 15 263 | 18 360 | 18 306 | 29 111 | 33 875 | 28 477 | 27 954 | 20 000 |
| Korea Rep. | 20 450 | 22 294 | 20 533 | 22 888 | 20 954 | 16 172 | 21 679 | 20 847 | 15 721 | 21 400 | 12 250 | 20 342 | 17 845 | 17 938 | 15 593 | 15 900 |
| Brazil | 31 259 | 29 123 | 25 229 | 29 604 | 25 729 | 27 761 | 24 263 | 24 872 | 24 690 | 23 730 | 20 500 | 18 300 | 15 800 | 13 787 | 14 894 | 14 670 |
| Thailand | 9 550 | 8 470 | 8 093 | 9 226 | 13 522 | 14 359 | 11 438 | 11 211 | 10 950 | 11 056 | 7 576 | 8 312 | 13 229 | 15 281 | 14 690 | 14 300 |
| Maldives | 2 000 | 1 700 | 1 060 | 2 078 | 2 476 | 2 631 | 1 768 | 1 309 | 1 783 | 1 873 | 6 921 | 9 168 | 11 212 | 11 037 | 11 856 | 10 643 |
| Venezuela | 5 387 | 6 010 | 6 889 | 6 073 | 7 826 | 6 997 | 8 879 | 7 049 | 6 762 | 6 811 | 7 970 | 7 849 | 8 650 | 9 918 | 8 791 | 9 669 |
| Canada | 3 146 | 3 505 | 3 012 | 3 186 | 3 724 | 4 946 | 6 241 | 3 464 | 5 835 | 5 348 | 4 987 | 3 791 | 11 398 | 12 408 | 9 344 | 9 526 |
| Senegal | 3 575 | 1 156 | 2 778 | 2 773 | 2 601 | 2 931 | 4 378 | 3 910 | 4 964 | 2 792 | 4 003 | 3 996 | 6 233 | 7 477 | 6 765 | 8 985 |
| Australia | 9 613 | 9 359 | 7 138 | 7 521 | 10 596 | 13 528 | 14 195 | 8 255 | 6 682 | 7 297 | 8 796 | 9 928 | 8 648 | 8 958 | 8 718 | 8 921 |
| Portugal | 3 114 | 3 068 | 4 423 | 5 306 | 6 233 | 3 976 | 7 850 | 6 732 | 19 999 | 30 495 | 13 396 | 13 711 | 11 354 | 9 387 | 9 253 | 8 392 |
| Peru | 18 797 | 14 900 | 34 428 | 16 782 | 23 251 | 23 117 | 26 635 | 25 045 | 12 266 | 5 586 | 13 571 | 13 908 | 5 796 | 7 070 | 6 680 | 6 780 |
| Oman | - | - | - | 4 750 | 7 497 | 6 415 | 8 313 | 4 914 | 2 786 | 3 355 | 5 545 | 4 828 | 3 749 | 7 021 | 6 242 | 6 693 |
| Nigeria | 14 002 | 12 000 | 13 000 | 14 156 | 9 334 | 9 494 | 9 494 | 6 942 | 8 402 | 7 229 | 8 912 | 5 849 | 9 053 | 6 471 | 8 388 | 6 564 |
| Italy | 4 807 | 6 443 | 12 216 | 14 273 | 13 399 | 9 776 | 10 426 | 8 398 | 9 613 | 13 746 | 13 720 | 11 802 | 16 473 | 10 528 | 4 968 | 5 946 |
| Yemen | 1 180 | 798 | 448 | 1 407 | 1 030 | 915 | 704 | 1 329 | 639 | 2 749 | 6 067 | 6 537 | 6 455 | 4 636 | 4 878 | 5 100 |
| Norway | 9 584 | 9 813 | 10 110 | 7 821 | 6 451 | 5 067 | 5 199 | 7 992 | 11 117 | 12 317 | 11 803 | 10 998 | 7 393 | 5 025 | 3 987 | 2 755 |
| Others | 70 154 | 75 655 | 77 558 | 79 720 | 88 070 | 96 125 | 98 295 | 94 340 | 77 087 | 76 822 | 71 402 | 67 939 | 69 797 | 69 923 | 71 320 | 68 655 |
| Total | 618 939 | 568 265 | 601 944 | 626 231 | 634 234 | 669 656 | 692 736 | 675 520 | 692 927 | 713 379 | 729 043 | 741 321 | 756 892 | 752 766 | 804 002 | 789 862 |

Source: FAO - FID

Table 3 World chondrichthyan landings by fishing area in tonnes

| AREA | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Indian Ocean, Western | 21 300 | 21 300 | 29 900 | 17 800 | 19 700 | 23 100 | 22 500 | 28 500 | 24 900 | 24 800 | 36 300 | 34 500 | 47 800 | 52 600 | 58 300 | 52 600 |
| Pacific, Western Central | 4 200 | 7 500 | 8 500 | 9 100 | 9 600 | 9 700 | 9 700 | 10 300 | 9 600 | 9 700 | 13 100 | 14 700 | 16 000 | 17 100 | 24 100 | 31 300 |
| Atlantic, Northeast | 80 300 | 89 500 | 91 900 | 90 400 | 91 100 | 93 200 | 98 900 | 101 200 | 109 200 | 104 100 | 111 200 | 125 700 | 106 900 | 116 700 | 114 800 | 107 300 |
| Indian Ocean, Eastern | 18 600 | 18 900 | 20 000 | 11 200 | 11 800 | 11 900 | 12 500 | 14 100 | 14 400 | 14 000 | 19 800 | 18 900 | 22 300 | 24 300 | 21 800 | 27 400 |
| Atlantic, Southwest | 3 200 | 3 300 | 3 800 | 5 100 | 5 700 | 5 600 | 8 700 | 9 100 | 10 000 | 9 000 | 10 100 | 9 800 | 12 500 | 16 000 | 19 700 | 19 300 |
| Atlantic, Northwest | 599 | 702 | 490 | 690 | 852 | 778 | 828 | 1 111 | 1 224 | 1 550 | 1 049 | 3 220 | 3 962 | 7 513 | 10 669 | 6 790 |
| Pacific, Northwest | 121 700 | 107 700 | 113 800 | 118 000 | 125 200 | 121 700 | 123 300 | 123 200 | 111 300 | 111 300 | 111 800 | 105 800 | 111 000 | 104 200 | 69 900 | 70 800 |
| Pacific, Eastern Central | 70 | 420 | 201 | 393 | 4 011 | 4 138 | 4 676 | 4 912 | 5 915 | 4 982 | 5 082 | 4 064 | 3 825 | 2 100 | 11 794 | 12 764 |
| Atlantic, Eastern Central | 3 000 | 2 900 | 3 100 | 3 200 | 3 400 | 3 600 | 5 000 | 3 800 | 4 400 | 5 100 | 6 400 | 5 400 | 6 400 | 11 100 | 12 700 | 18 300 |
| Atlantic, Western Central | 3 926 | 3 912 | 2 619 | 2 906 | 3 106 | 3 410 | 3 710 | 3 006 | 3 007 | 4 114 | 4 114 | 3 923 | 6 321 | 6 020 | 7 916 | 8 318 |
| Pacific, Southwest | 1 000 | 1 100 | 1 800 | 1 900 | 2 300 | 1 900 | 1 900 | 2 100 | 2 200 | 2 200 | 2 300 | 2 300 | 2 700 | 2 700 | 9 000 | 10 600 |
| Mediterranean/Black Sea | 8 100 | 8 700 | 8 500 | 9 100 | 10 500 | 9 900 | 15 800 | 11 700 | 13 200 | 12 300 | 12 400 | 14 300 | 11 500 | 9 600 | 12 100 | 14 400 |
| Pacific, Southeast | 1 700 | 1 500 | 3 200 | 3 700 | 5 200 | 3 300 | 4 300 | 4 300 | 4 300 | 4 900 | 7 800 | 4 100 | 5 700 | 5 600 | 7 600 | 8 600 |
| Pacific, Northeast | 2 218 | 2 323 | 3 048 | 2 746 | 2 623 | 2 419 | 2 525 | 2 917 | 3 223 | 3 632 | 1 936 | 1 971 | 1 432 | 1 321 | 2 917 | 2 176 |
| Atlantic, Southeast | 1 900 | 1 500 | 1 300 | 1 500 | 1 600 | 1 500 | 2 100 | 2 600 | 3 000 | 3 000 | 2 600 | 3 200 | 3 100 | 2 700 | 1 300 | 3 700 |
| Atlantic, Antarctic | | | | | | | | | | | | | | | 0 | 0 |
| Indian Ocean, Antarctic | | | | | | | | | | | | | | | | |
| Total | 271 813 | 271 257 | 292 158 | 277 735 | 296 712 | 296 145 | 316 439 | 322 846 | 319 869 | 314 678 | 345 981 | 351 878 | 361 440 | 379 554 | 384 596 | 394 348 |

Table 3 World chondrichthyan landings by fishing area in tonnes (continued)

| AREA | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Indian Ocean, Western | 69 300 | 73 900 | 71 200 | 80 600 | 74 800 | 79 700 | 110 400 | 149 700 | 91 625 | 91 999 | 92 654 | 109 607 | 124 899 | 121 985 | 115 845 | 116 373 |
| Pacific, Western Central | 35 400 | 34 300 | 43 300 | 46 600 | 43 890 | 46 440 | 46 620 | 55 720 | 58 851 | 75 965 | 71 059 | 71 368 | 77 226 | 67 584 | 82 552 | 84 514 |
| Atlantic, Northeast | 106 100 | 104 700 | 106 400 | 127 700 | 111 600 | 100 700 | 109 100 | 100 600 | 91 893 | 98 510 | 89 966 | 83 213 | 91 878 | 88 544 | 82 693 | 83 150 |
| Indian Ocean, Eastern | 28 500 | 25 000 | 28 600 | 28 700 | 37 210 | 34 960 | 34 880 | 22 780 | 46 022 | 41 733 | 40 644 | 40 109 | 41 310 | 39 838 | 48 107 | 51 433 |
| Atlantic, Southwest | 20 000 | 24 600 | 27 700 | 24 200 | 23 800 | 25 400 | 20 400 | 41 100 | 36 296 | 37 083 | 29 835 | 27 328 | 29 584 | 34 254 | 37 159 | 35 621 |
| Atlantic, Northwest | 13 136 | 6 362 | 15 886 | 24 349 | 15 661 | 37 212 | 39 573 | 36 212 | 40 270 | 49 331 | 29 724 | 14 706 | 7 628 | 10 761 | 11 120 | 12 762 |
| Pacific, Northwest | 66 600 | 67 000 | 83 600 | 88 400 | 92 900 | 84 100 | 88 700 | 85 900 | 88 235 | 98 784 | 100 596 | 103 999 | 88 921 | 89 071 | 89 388 | 81 738 |
| Pacific, Eastern Central | 10 167 | 12 557 | 9 783 | 10 556 | 13 430 | 12 230 | 11 930 | 15 930 | 16 605 | 14 141 | 14 892 | 16 451 | 22 055 | 26 330 | 27 554 | 32 701 |
| Atlantic, Eastern Central | 19 100 | 14 000 | 16 200 | 21 600 | 21 400 | 26 300 | 27 900 | 27 300 | 35 575 | 38 834 | 32 146 | 34 638 | 40 474 | 42 887 | 37 914 | 27 491 |
| Atlantic, Western Central | 7 443 | 8 301 | 8 948 | 9 217 | 6 500 | 7 200 | 7 400 | 10 200 | 10 916 | 11 444 | 11 634 | 13 202 | 11 545 | 14 012 | 13 971 | 19 888 |
| Pacific, Southwest | 12 100 | 9 700 | 4 300 | 3 700 | 4 400 | 6 100 | 4 600 | 5 900 | 5 810 | 5 744 | 7 358 | 8 638 | 6 956 | 7 563 | 10 963 | 11 690 |
| Mediterranean/Black Sea | 15 500 | 23 600 | 19 000 | 16 900 | 12 300 | 16 000 | 12 090 | 8 443 | 10 809 | 9 976 | 12 429 | 12 619 | 13 209 | 24 787 | 16 890 | 18 133 |
| Pacific, Southeast | 11 600 | 21 500 | 26 000 | 15 900 | 20 200 | 12 900 | 13 400 | 24 300 | 18 612 | 16 227 | 12 517 | 17 052 | 19 556 | 17 122 | 19 433 | 24 008 |
| Pacific, Northeast | 2 074 | 1 648 | 1 538 | 1 326 | 1 000 | 500 | 400 | 5 500 | 2 355 | 1 935 | 3 862 | 5 315 | 6 628 | 9 899 | 10 126 | 5 014 |
| Atlantic, Southeast | 8 500 | 6 600 | 6 700 | 7 000 | 6 800 | 4 700 | 6 800 | 7 100 | 5 147 | 3 708 | 2 495 | 4 074 | 17 689 | 8 770 | 4 849 | 7 426 |
| Atlantic, Antarctic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1 | 224 | 120 |
| Indian Ocean, Antarctic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 425 520 | 433 768 | 469 155 | 506 748 | 485 891 | 494 442 | 534 193 | 596 685 | 559 021 | 595 414 | 551 811 | 562 319 | 599 566 | 603 408 | 608 788 | 612 062 |

Table 3 World chondrichthyan landings by fishing area in tonnes (continued)

| AREA | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Indian Ocean, Western | 121 127 | 73 017 | 69 670 | 85 738 | 88 680 | 92 317 | 95 335 | 96 474 | 96 056 | 107 521 | 120 669 | 135 148 | 146 021 | 145 590 | 204 292 | 196 638 |
| Pacific, Western Central | 86 642 | 83 011 | 94 861 | 105 646 | 110 242 | 119 879 | 122 762 | 147 155 | 164 936 | 162 157 | 150 204 | 149 083 | 146 811 | 156 441 | 144 895 | 139 807 |
| Atlantic, Northeast | 77 018 | 87 198 | 87 687 | 90 731 | 90 117 | 100 022 | 93 225 | 81 186 | 80 154 | 79 872 | 84 456 | 78 137 | 78 805 | 80 204 | 77 677 | 78 102 |
| Indian Ocean, Eastern | 48 227 | 52 423 | 54 104 | 49 245 | 55 475 | 60 033 | 78 631 | 58 598 | 49 758 | 58 935 | 63 616 | 82 013 | 87 114 | 81 420 | 80 377 | 77 655 |
| Atlantic, Southwest | 45 779 | 40 283 | 38 479 | 47 297 | 44 770 | 45 691 | 49 138 | 46 215 | 45 826 | 53 273 | 46 678 | 44 386 | 47 283 | 50 006 | 56 595 | 54 937 |
| Atlantic, Northwest | 10 080 | 11 896 | 9 325 | 22 649 | 29 554 | 37 647 | 34 978 | 31 460 | 51 245 | 61 408 | 42 915 | 44 192 | 45 879 | 46 663 | 56 130 | 48 140 |
| Pacific, Northwest | 78 210 | 76 878 | 72 425 | 69 323 | 66 430 | 59 822 | 41 614 | 48 330 | 46 494 | 47 303 | 45 542 | 52 469 | 38 302 | 33 508 | 31 201 | 38 056 |
| Pacific, Eastern Central | 32 204 | 24 646 | 25 878 | 26 379 | 24 046 | 23 170 | 29 420 | 26 238 | 33 385 | 31 129 | 33 682 | 34 153 | 35 553 | 37 447 | 37 156 | 32 675 |
| Atlantic, Eastern Central | 29 898 | 25 601 | 29 142 | 32 106 | 22 549 | 26 545 | 27 441 | 23 531 | 26 015 | 22 593 | 27 287 | 26 290 | 31 207 | 29 558 | 31 878 | 31 658 |
| Atlantic, Western Central | 20 258 | 24 710 | 27 950 | 25 463 | 24 836 | 25 018 | 30 786 | 32 513 | 33 678 | 30 711 | 33 725 | 30 467 | 36 946 | 32 493 | 30 859 | 31 250 |
| Pacific, Southwest | 12 359 | 13 113 | 15 037 | 15 251 | 13 336 | 14 772 | 19 090 | 13 592 | 14 711 | 14 098 | 12 752 | 17 808 | 16 876 | 18 086 | 14 909 | 23 508 |
| Mediterranean/Black Sea | 22 351 | 25 183 | 26 440 | 25 589 | 23 886 | 21 699 | 22 932 | 20 228 | 17 356 | 18 720 | 20 680 | 16 904 | 23 612 | 19 279 | 14 420 | 15 177 |
| Pacific, Southeast | 21 803 | 18 262 | 40 058 | 20 505 | 27 943 | 28 932 | 34 165 | 34 852 | 20 397 | 13 425 | 22 388 | 21 591 | 13 236 | 12 152 | 12 975 | 12 457 |
| Pacific, Northeast | 5 314 | 5 602 | 5 254 | 4 791 | 6 757 | 8 683 | 7 808 | 4 724 | 5 883 | 8 797 | 20 415 | 3 238 | 4 728 | 5 330 | 7 285 | 6 026 |
| Atlantic, Southeast | 7 568 | 6 441 | 5 610 | 5 470 | 5 593 | 5 426 | 5 411 | 10 424 | 7 033 | 3 437 | 4 031 | 5 442 | 4 506 | 4 499 | 3 312 | 3 743 |
| Atlantic, Antarctic | 1 | 0 | 7 | 44 | 17 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 11 | 90 | 40 | 30 |
| Indian Ocean, Antarctic | 1 | 17 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 1 | 3 |
| Total | 618 939 | 568 265 | 601 944 | 626 231 | 634 234 | 669 656 | 692 736 | 675 520 | 692 927 | 713 379 | 729 043 | 741 321 | 756 892 | 752 766 | 804 002 | 789 862 |

Source: FAO - FIDI.

3.4 COMMENTS

There are several reasons for regarding the above figures as great underestimates of actual chondrichthyan catches. This is due to the lack of reporting, in particular on stocks incidentally captured as bycatch or discarded at sea, as well as on those taken by recreational, subsistence and artisanal fisheries. FAO catch data are from commercial, industrial, recreational, subsistence and artisanal fisheries but the last three categories are likely to be substantially under reported. In some areas, for example in the USA, recreational fishers contribute a significant percentage of total national catches and landings of chondrichthyan species. Moreover, there are countries, such as China (mainland) that do not report any catches or landings of chondrichthyans to FAO. In the case of China there are estimates from Bonfil¹⁴, based on shark fins exports to Southeast Asian countries¹⁵, that indicate an increase in Chinese shark catch from less than 100 tonnes in 1981 to between 17 000 and 28 000 tonnes in 1991. The Bureau of Fisheries provided data on Chinese elasmobranch catches in response to Notification number 884 from the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). According to this data, total landings of sharks are between 4 000 and 7 000 tonnes per annum. However, there are other estimates of 22 500 tonnes for Chinese landings of sharks¹⁶.

In addition to being directly targeted in various commercial and recreational fisheries throughout the world, a great number of sharks and other chondrichthyans are landed from multi-species fisheries or taken as bycatch in fisheries targeting other species such as tuna, swordfish, shrimps, squid and other species all over the globe. They are usually thrown back, unrecorded, into the sea. The long-line fisheries for tuna of Japan, Korea and Taiwan Province of China account for most of this bycatch. Many countries do not report the enormous numbers of sharks taken as bycatch. Like other aspects of shark fisheries, incidental capture is very poorly documented. According to Bonfil¹⁷, the estimated annual elasmobranch bycatch at the end of the 1980s was between 260 000 and 300 000 tonnes or 11.6-12.7 million fish, of which the greater part were sharks, mainly blue sharks. About 80% of the estimated total elasmobranch bycatch by weight and about 70% by number of fish came from longline fisheries. Table 4 shows Bonfil's reported estimates, of which, according to him, 4 075 162 were blue sharks.

Table 4 Selected estimates of shark taken as bycatch by longline, high seas fisheries

| Area | Number of individuals | Total catch in tonnes |
|-----------------------------|-----------------------|-----------------------|
| Atlantic Ocean | 2 305 940 | 76 318 |
| Indian Ocean | 1 931 574 | 75 180 |
| South/Central Pacific Ocean | 1 996 350 | 39 927 |
| North Pacific (above 20°N) | 2 050 135 | 41 000 |
| Total | 8 283 999 | 232 425 |

Source: Table 2.21, page 96, Bonfil.

¹⁴ BONFIL R., *idem*.

¹⁵ WONGSAWANG P., Southeast Asian Fisheries Development Center (SEAFDEC), pers. comm., "Fisheries statistical bulletin for the South China Sea area, Thailand 1992.

¹⁶ PARRY-JONES R., "TRAFFIC report on shark fisheries and trade in the People's Republic of China", in "TRAFFIC report on shark fisheries and trade in the East Asian region", of the "The world trade in sharks: a compendium of TRAFFIC's regional studies volume I", TRAFFIC, 1996.

¹⁷ BONFIL R., *idem*.

According to Bonfil¹⁸, the former high seas drift-net fisheries ranked second in their contribution to the elasmobranch bycatch. Since the end of 1992 their activities were stopped due to the moratorium on the use of large-scale drift-nets. In the late 1980s observers recorded that over 20 000 blue sharks were caught annually by California drift-net fisheries alone. More than 80% of the bycatch of the drift-net fleet of Taiwan Province of China were sharks. Total elasmobranch bycatch in purse-seine fisheries has been estimated at 6 345 tonnes for 1989¹⁹.

Discards from high seas fisheries are also high. According to Bonfil²⁰, up to 230 000-240 000 tonnes of *Elasmobranchii* are discarded annually by various high seas fisheries. The amount of discarded stocks and survival rates of released sharks are uncertain. Depending upon the fisheries, sharks may or may not be retained. Discarded sharks may or may not survive, depending upon the type of gear, the species, and whether the fins are removed before discarding. For instance, most discards, certainly those caught by the drift-net, purse-seine and orange roughy fisheries, generally do not survive. Some species of sharks may survive when hooked on longlines if the fishermen release sharks quickly and unharmed. Other species that must maintain movement are less likely to survive. In the past sharks were usually released or discarded and there are reports that indicate that around 66% of the discards survived²¹. By the late 1980s the increase in price and demand for the fins caused the previously released or discarded sharks to be retained as bycatch or, more usually, to be brought on board to be finned. Finning is the name given to the practice of capturing sharks, cutting off their fins and throwing them back, often still alive, into the water. Although the main market for fins is Asia where they are made into shark fin soup, the demand for fins is on the increase elsewhere. Finning is especially attractive because the fins can be dried easily, and stored without expensive on-board preparation and refrigeration equipment. Poor fishermen can get into the game, and large fleets can increase their profits with little effort. Finning occurs legally all over the oceans, with the exception of the Atlantic waters off Canada and the USA, in Californian state waters, in Oman and South Africa.

Taking all the under-estimates reported above together, Bonfil²² estimated that the actual total catch of sharks, batoids and chimaeras was about 1 350 000 tonnes in 1991 or nearly twice FAO's reported catch statistics for that year. This figure includes the estimated catch of the People's Republic of China and the catch from large-scale high seas fisheries previously seen, and estimates of the mortality of sharks in recreational fisheries. All indications are that the data on shark have not improved over time and therefore the total catch of sharks can again be estimated at twice the recorded catch, which means nearly 1.6 million tonnes in 1997.

3.5 PROTECTION/REGULATIONS

Over the past 20 years human exploitation of sharks has substantially increased worldwide, with the result that some populations are now believed to be endangered in several

¹⁸ BONFIL R., *idem*.

¹⁹ BONFIL R., *idem*.

²⁰ BONFIL R., *idem*.

²¹ BERKLEY S.A and CAMPOS W.L., "Relative abundance and fishery potential of pelagic sharks along Florida's east coast", *Marine Fisheries Review*, 1988.

²² BONFIL R., *idem*.

areas. It is far from easy to estimate the impact of the fishing pressure and of worldwide population trends from the available figures. Hard data are scarce, but biologists think that of the 100 exploited species, 20 or so are in most trouble and are considered vulnerable, endangered or critically endangered. There are signs that governments, too, are beginning to take the problem seriously.

Many shark species are particularly vulnerable to over-exploitation due to their biological characteristic of low reproductive potential and therefore limited capacity to recover from overfishing. Historically, there are documented decreases in shark stocks due to intensive catches, such as the California tope shark in the 1940s, the Australian schoolfin shark in the 1940s, 1950s and 1970s, the picked dogfish fishery of British Columbia (1940s) and in the North Sea (1960s), the porbeagle shark fishery in the Northwest Atlantic in the 1960s and the basking shark in the 1950-60s.

Limited knowledge of shark biology, of the size and status of their stocks, of the real volume of their captures and of their population dynamics presents serious difficulties for fishery management. Few nations sponsor shark research, monitor shark trade or conduct other sustainable management programs for sharks. No international treaties and management strategies exist for shark fished on the high seas, and only Australia, Canada, New Zealand, and the USA (Atlantic coast only) have begun to manage sharks within their coastal waters. Management plans are in development by Mexico and South Africa. Shark fishing restrictions are currently set up in South Africa, Australia, New Zealand, European Union, Canada, USA, Brazil, Philippines, and Israel²³.

A growing international concern over the possible effects of continued exploitation on marine food chains is emerging together with the need for improved control of fishing for shark species. CITES resolution on the biological and trade status of sharks (Conf. 9.17) and Decision 10.73 and respective related decisions by COFI XXI, XXII and the Kyoto Conference in 1995 resulted in an FAO work programme of which this book is one of the outputs and which led to the adoption of the IPOA (national plan of action for conservation and management of shark stocks) on sharks (full text in Appendix I).

Castro, Woodley and Brudeck²⁴ have evaluated the status of all valid species of sharks listed by Compagno with a few additions or changes. The species have been divided into two groups: "Not-exploited species" (species that are not currently targeted by fisheries, and that are not normally found in the bycatch of any fisheries) and "Exploited species" (species that are directly exploited by fisheries or taken as bycatch). In turn, the exploited species have been divided into the following categories:

- **Category 1:** Exploited species that can not be placed on any of the subsequent categories, because of lack of data.
- **Category 2:** Species pursued in directed fisheries, and/or regularly found in bycatch, whose catches have not decreased historically, probably due to their higher reproductive potential.

²³ In Israeli waters there is a generalized protected status for all *Elasmobranchii*.

²⁴ CASTRO J.L., WOODLEY C.M and BRUDEK R.L., *idem*.

- **Category 3:** Species that are exploited by directed fisheries or bycatch, and have a limited reproductive potential, and/or other life history characteristics that make them especially vulnerable to overfishing, and/or that are being fished in their nursery areas.
- **Category 4:** Species in this category show substantial historical declines in catches and/or have become locally extinct.
- **Category 5:** Species that have become rare throughout the ranges where they were formerly abundant, based on historical records, catch statistics, or expert's reports.

The following species are classified as **category 3**:

Bluntnose sixgill shark (*Hexanchus griseus*), Kitefin shark (*Dalatias licha*), Greenland shark (*Somniosus microcephalus*), Pacific angel shark (*Squatina californica*), Pelagic thresher (*Alopias pelagicus*), Bigeye thresher (*Alopias superciliosus*), Basking shark (*Cetorhinus maximus*), Great white shark (*Carcharodon carcharias*), Longfin mako (*Isurus paucus*), Gummy shark (*Mustelus antarcticus*), Blacknose shark (*Carcharhinus acronotus*), Copper shark (*Carcharhinus brachyurus*), Silky shark (*Carcharhinus falciformis*), Finetooth shark (*Carcharhinus isodon*), Bull shark (*Carcharhinus leucas*), Blacktip shark (*Carcharhinus limbatus*), Oceanic whitetip shark (*Carcharhinus longimanus*), Spot-tail shark (*Carcharhinus sorrah*), Blue shark (*Prionace glauca*), Scalloped hammerhead (*Sphyrna lewini*), Great hammerhead (*Sphyrna mokarran*), Smalleye hammerhead (*Sphyrna tudes*).

The species listed below are considered as **category 4**:

Bramble shark (*Echinorhinus brucus*), Picked dogfish (*Squalus acanthias*), Sand tiger shark (*Carcharias taurus*), Thresher shark (*Alopias vulpinus*), Shortfin mako (*Isurus oxyrinchus*), Porbeagle (*Lamna nasus*), Whiskery shark (*Furgaleus macki*), Tope shark (*Galeorhinus galeus*), Leopard shark (*Triakis semifasciata*), Dusky shark (*Carcharhinus obscurus*), Sandbar shark (*Carcharhinus plumbeus*), Night shark (*Carcharhinus signatus*) and the Blacktip shark (*Carcharhinus limbatus*) when found in shallow coastal waters.

No species have been classified in the **category 5**.

According to the Ocean Wildlife Campaign, a coalition of six conservation groups, some Atlantic species may have declined as much as 80%, partly because of overfishing. They claim that there is a decline of large coastal sharks such as sandbar, bull (*Carcharhinus leucas*), tiger, dusky, lemon (*Negaprion acutidens*) and nurse sharks.

The IUCN Red List assessments for *Elasmobranchii* (updated from the 1996 Red List of threatened animals)²³ considered the following species as:

critically endangered:

Ganges shark (*Glyphis gangeticus*), freshwater sawfish (*Pristis microdon*) in South East Asia, smalltooth sawfish (*Pristis pectinata*) in Northeast and Southwest Atlantic,

²³ CAMHI M., FOWLER S., MUSICK J., BRÄUTIGAM A., FORDHAM S., "Sharks and their relatives. Ecology and conservation", IUCN, 1998.

largetooth sawfish (*Pristis perotteti*), Brazilian guitarfish (*Rhinobatos horkelii*), giant freshwater stingray (*Himantura chaophraya*) in Thailand.

endangered:

Sandtiger shark (*Carcharias taurus*) in Southwest Atlantic and Eastern Australia, freshwater sawfish, smalltooth sawfish, common sawfish (*Pristis pristis*), common skate (*Raja batis*).

vulnerable:

Sandtiger shark, great white shark, porbeagle in Northeast Atlantic, basking shark, dusky shark in the Northwest Atlantic, giant freshwater stingray.

lower risk, near threatened:

Bluntnose sixgill shark (*Hexanchus griseus*), porbeagle, blacktip shark, dusky shark, sandbar shark, kitefin shark (*Dalatis licha*), blue shark.

data considered deficient for:

Whale shark, deepsea skate (*Bathyraja abyssicola*).

In general the following species are considered to be at risk: blue, thresher, mako, porbeagle, salmon (*Lamna ditropis*), silky, oceanic whitetip shark (*Carcharhinus longimanus*) and hammerheads. These species are relatively abundant but there is concern about the great number of these sharks caught incidentally. Other species such as great white shark, whale shark, cookiecutter sharks (*Isistius brasiliensis* and *labialis*), largetooth cookiecutter (*Isistius plutodus*), pygmy shark (*Squaliolus aliae* and *Euprotomicrus bispinatus*), spined pygmy shark (*Squaliolus laticaudus*), and longnose pygmy shark (*Heteroscymnoides marleyi*) are landed in relatively low amounts but, being rather scarce, they are potentially at risk.

Among the species considered endangered are the great white, basking shark, the whale shark and pickled dogfish.

The white shark is rather rare and ranges all the world's oceans. It has a low reproductive potential. The greatest threat to this species, irrespective of region, is indirect commercial fisheries. Although not universally so, white shark flesh often has a high market value and is readily marketed for human consumption, often "lumped" for sale with the flesh from other more common Lamnidae. Furthermore, it has a role as a hunted trophy. In April 1991, South Africa became the first country to ban the killing of great white sharks. This species is actually protected from directed fishing in Namibia (1994), the Maldives, Gulf of Mexico, Atlantic Coast of the USA, California. Since December 1997 the great white shark is protected in all commonwealth waters of Australia, replacing earlier legislation enacted on a unilateral state-to-state basis by Tasmania, Western Australia, Queensland, and New South Wales. On 28 February 1998, the white shark achieved the status of endangered species in the area of São Paulo State in Brazil. Future additional effort will probably include the Mediterranean, after ratification of the Barcelona Convention's appendix II (which cites white sharks, alongside basking sharks and devil rays, as "endangered" Mediterranean fish).

Basking sharks were protected off the Isle of Man and, since 9 March 1998, throughout UK national waters. There is concern about the status of its stocks as basking sharks are considered one of the species most vulnerable to overfishing. In the 1950s the population of

basking sharks was depleted off the coast of the west Ireland and there is still no sign of recovery.

On March 25, 1998, faced with sharply decreasing numbers of whale sharks and manta rays, the Philippine government has banned killing or selling them. The whale sharks are fully protected in Western Australia under the Wildlife Conservation Act and CALM (Department of Conservation and Land Management) Act. Fisheries targeting whale sharks are very small and exist mainly in India, the Philippines, and Taiwan Province of China. Whale shark has scarce commercial importance elsewhere. It was mainly fished for its meat but nowadays the fins and oil are also used.

Picked dogfish are considered to be seriously overfished in the Atlantic. The average size of mature females is reduced and, according to Castro, Woodley and Brudeck²⁶, their conservation status is highly vulnerable. Catches of this species have considerably increased in the last decade. There has been a substantial decline in the Northeast Atlantic and a huge growth in the Northwest Atlantic. There is a major problem due to the fact that this species lives mainly in schools of fish of uniform sex or size and fisheries for picked dogfish target mainly mature females, which are larger than males, as the European market especially appreciates larger specimens. The decline in female dogfish numbers affects the reproduction of this species particularly as female picked dogfish do not begin to reproduce until they are at least 13 years old. The gestation period is two years long.

4. UTILIZATION

Though sharks make up only a small percentage of the species targeted by the world's fisheries, they are extremely versatile and humans can use much of the carcass. Meat and fins have been traditionally eaten but also skin and internal organs are often used for food. Shark fins have become one of the world's most lucrative fisheries' commodities, particularly appreciated in Chinese cuisine. Shark cartilage has been claimed to be beneficial in a great variety of diseases, such as arthritis, psoriasis colitis, acne, enteritis, phlebitis, rheumatism, peptic ulcers, haemorrhoids, herpes simplex, melanoma, recently also AIDS, and above all cancer. Even though its benefits are unproved, a new market for shark cartilage as an alternative therapy for cancer treatment and prevention has been created. Sharks are also valued for their liver oils, specially the hexaunsaturated isoprenoid alkene squalene. Interest in shark liver oil dates back hundreds of years. In the 18th and 19th century, it was used for lighting. Before and during the Second World War, shark livers were in demand for their rich stores of Vitamin A. Since then Vitamin A from shark liver oil has been largely replaced by the synthetic product. Nowadays liver oil is mainly used in the textile and tanning industries and in the production of cosmetics, pharmaceutical products, and lubricants. The skins can be manufactured to produce high-quality leather or used as an abrasive. Discards are also used for the production of fishmeal and fertilizer. In addition shark teeth and jaws are marketed and sold. The composition and weight of sharks vary considerably between species as can be seen in the following table.

²⁶ CASTRO J.J., WOODLEY C.M and BRUDEK R.L., *idem*.

Table 5 Weight composition of some shark species

| Species | Ratio of body parts, percentages | | | | | | | |
|------------------------|----------------------------------|--------|------|----------|-------|-------|------|------|
| | Trunk | Fillet | Head | Viscera* | Liver | Bones | Fins | Skin |
| Horn | 33.6 | 20.8 | 38.6 | 15.6 | 5.2 | 5.8 | 11.2 | 9.6 |
| Sevengill | 52.0 | 35.0 | 29.0 | 13.7 | 4.4 | 6.8 | 5.0 | 9.8 |
| Salmon | - | - | - | - | 12.0 | - | - | - |
| Thresher | - | - | - | - | 10.0 | - | - | - |
| Lesser spotted dogfish | 36.6 | - | 20.0 | 39.2 | 6.6 | - | 4.1 | - |
| Korothokhvostaya | 56.4 | 45.5 | 22.2 | 18.7 | 7.9 | 3.3 | 5.4 | 7.5 |
| Krivozubaya | 61.0 | 51.0 | 21.8 | 10.6 | 2.7 | 4.8 | 5.8 | 5.0 |
| Vysokoperaya | 48.4 | 40.0 | 31.6 | 12.6 | 4.2 | 3.2 | 5.8 | 5.3 |
| Copper | 41.8 | 35.4 | 26.5 | 26.6 | 12.7 | 2.2 | 5.1 | 4.2 |
| Blacktip | 67.3 | 56.0 | 19.3 | 13.2 | 3.1 | 2.6 | 1.5 | 7.2 |
| Kosyachnaya | 53.1 | 49.6 | 21.0 | 20.8 | 9.5 | 4.1 | 5.1 | 5.1 |
| Soupfin) | 44.7 | - | 14.9 | 35.7 | 2.9 | - | 4.5 | - |
| Whitetip | 50.1 | 37.2 | 30.4 | 12.7 | 7.3 | 3.6 | 6.4 | 8.4 |
| Dinnorukaya | 55.8 | 45.5 | 27.2 | 10.6 | 5.3 | 3.2 | 6.7 | 5.8 |
| Smooth-hound | 60.8 | 45.9 | 22.0 | 13.0 | 2.7 | 9.4 | 4.5 | 5.4 |
| Blue | 54.6 | 40.2 | 21.3 | 12.2 | 4.4 | - | 6.0 | 12.0 |
| Hammerhead | 62.0 | 54.4 | 18.3 | 13.7 | 5.5 | 3.4 | 5.3 | 4.2 |
| Kitefin | 33.3 | 23.0 | 17.1 | 46.1 | 19.2 | 3.0 | 2.5 | 7.3 |
| Silky | 61.2 | 52.3 | 21.3 | 9.2 | 2.9 | 3.9 | 4.8 | 4.9 |
| Tiger | 47.6 | 36.2 | 21.3 | 28.1 | 17.5 | 3.0 | 4.9 | 8.0 |

*Including the liver

Source: Gordievskaya, *Shark flesh in the food industry, 1973*

If in theory each part of most sharks can be used, in practice it is extremely problematic to obtain all the different products from one animal, as not all sharks are appropriate due to size and biological features. It is also impossible to produce at the same time good quality meat in fresh or frozen form and leather from the same shark. The processors have to decide in advance which will be the major product, meat or hides. Good quality meat can only be obtained if the shark has been appropriately handled after it is caught. It has to be immediately bled, dressed and iced to prevent urea from contaminating the meat, but the exposure to fresh water or to ice usually damages shark skins. At the same time sharks cannot be iced before being skinned, and meat of such sharks is not suitable for frozen products. Another important reason for the partial processing of caught sharks is also the actual market value of the different products. Often only the most valuable parts are used and processed, such as fins and, nowadays, also cartilage, while the rest of the animal is discarded. Fins are nearly always used but not all sharks have fins large enough to obtain high prices. The value of livers is not as high as in the past and moreover valuable livers are found only in a restricted number of deepwater sharks.

Sharks do not all have the same commercial value nor can they be used in the same way. Regional preferences need to be taken into consideration; some species are valued in certain countries while they may not be appreciated elsewhere. The table in Appendix II summarises the available information on the use of sharks in different countries.

5. PRODUCTION AND TRADE

Production and trade data are useful in highlighting important markets and uses for shark products. Similar to the difficulties seen with catch data, available trade statistics are currently affected by a series of problems that seriously limit the correctness of reported volumes and values of shark products in trade. They are often inadequate and not precise enough to state the species and areas of most interest in this trade. Knowledge regarding utilization of sharks is often limited, as national fisheries statistics frequently do not record production and trade of the various shark products. This is valid at both national and international levels. Standard 6-digit Customs tariff headings, used under the Harmonised System of classification, are specific for only "dogfish and other sharks". A limited number of countries employ sub-codes to split "dogfish", "catsharks", and "other sharks" and/or identify shark fins, but data on production and trade of shark skins and leather, liver oil, jaws, fishmeal and fertilizer are rarely recorded. Moreover, production and trade in shark cartilage, which is increasingly marketed as a health supplement worldwide, is practically undocumented. The problem is more evident in production statistics as several nations record imports and exports of shark products (especially meat, but also fins), but not their domestic production. Further, there are cases, as in the USA for fins, in which imports for a shark product may be reported but not exports or *vice versa*.

These problems are mirrored in FAO statistics that are, as said previously, compiled from national reports. Even though they are the most exhaustive data available on world production and trade of fish and fishery products, they are also likely to represent only a small fraction of the actual world shark production and trade volumes. FAO data are highly incomplete and thereby misleading if employed to deduce the respective importance of, or trends for, various shark products. It is not possible to identify the total shark volume from these statistics, as sharks are often included with other chondrichthyan species. The statistics are limited by the lack of species-specific data reported by most countries, which often summarize information when reporting to FAO. With the exception of a limited number of countries, which have reported their exports and imports of dogfish since 1995, FAO statistics on production and trade provide no information on the various shark species involved. Moreover, there is the problem that several countries do not report their production or trade statistics to FAO at all. It may be noted that FAO and EUROSTAT statistics, both quoted in this report, often differ.

There is the risk that recorded trade data on fins may substantially over-estimate the real volume as fins often pass through a series of countries for repeated processing and transhipment with the consequent risk of repeated counting. There is also the possibility that for meat, different and incorrect standard conversion factors are used by different reporting countries to convert weight into live or carcass weights, as sharks differ widely by species, processing technique, country and region.

5.1 PRODUCTION

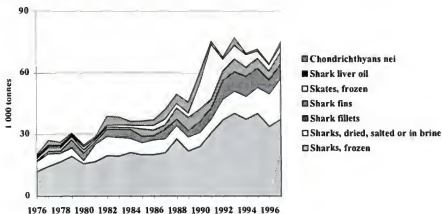
Table 6 reports world chondrichthyan production by the different products from 1976 to 1997 according to FAO statistics. Total production has considerably increased in this period, going from 20 300 tonnes in 1976 to 75 400 tonnes in 1997 and peaking at nearly 77 200 tonnes in

1993. Frozen whole shark is by far the main item produced with nearly 37 600 tonnes in 1997, followed by sharks, dried, salted or in brine (19 900 tonnes) and frozen shark fillets (4 200 tonnes). During the last few years a major increase has been experienced in the production of dried, salted or in brine sharks.

In 1997 Pakistan was the major producer of chondrichthyan products with nearly 19 100 tonnes, followed by Spain, the USA, Japan, Mexico, Taiwan Province of China and New Zealand (Table 7). With the exception of Japan, the countries reported above have shown impressive growths in their recorded production, in particular Pakistan, Spain and until 1995 the USA. Pakistan has considerably increased its production of dried, salted or in brine sharks in the 1990s. Growth has been particularly significant in the last three years as a consequence of its increased catch. In 1997 Pakistan produced nearly 19 000 tonnes of dried, salted or in brine sharks and 90 tonnes of dried and salted shark fins. Spain has shown one of the major rises in the last few years, going from 500 tonnes in 1992 to 12 100 tonnes in 1997. In 1997 Spain became the leading producer of frozen sharks.

Until 1996 Japan was the major producer of frozen sharks, with 7 500 tonnes. In 1997 its production was of 8 400 tonnes. Notwithstanding the slight increases experienced in the last two years, Japanese output has substantially declined due to the decrease in its shark catch. In the last few years Italian and Indonesian production have significantly dropped. In 1996 Indonesia reported to FAO only 1 700 tonnes as compared to 9 000 tonnes in 1995, while in 1997 its production has increased to 3 030 tonnes. In 1997 Italy reported no production of *Elasmobranchii* to FAO, and in 1996 it was only 250 tonnes, compared with 4 900 tonnes in 1992.

Figure 22 Chondrichthyan production by product form in 1 000 tonnes, 1976-1997

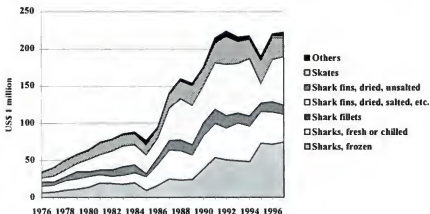


Source: FAO - FIDI.

5.2 EXPORTS

According to FAO statistics, in 1997 total world chondrichthyan exports amounted to nearly 65 000 tonnes worth US\$223.1 million (Table 8 and Table 9). This represents a substantial increase as compared to 20 300 tonnes, valued at US\$35.0 million, in 1976. There has also been a growth in the number of countries reporting exports in the same period, in 1976 there were 35 and in 1997 there were 73. In 1997 the bulk of the exports in volume consisted of frozen whole sharks (35 000 tonnes, valued at US\$73.6 million), followed by fresh or chilled whole sharks (13 200 tonnes worth US\$33.1 million). Exports of shark fins in this year were less than 6 300 tonnes, valued at US\$65.4 million. Table 10 reports the unit value of chondrichthyan exports by product.

Figure 23 Chondrichthyan exports by product form in US\$ 1 million, 1976-1997

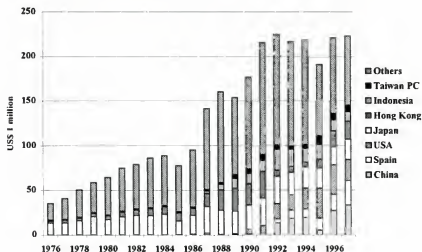


Source: FAO-FIDI.

In 1997 Spain was the leading exporting country of chondrichthyans (Table 11 and Table 12). In 1997 its exports amounted to 12 400 tonnes, valued at US\$27.4 million. The great bulk of these exports consisted of frozen sharks (12 100 tonnes, value US\$26.9 million). Other significant exporting countries were the USA, Japan, Taiwan Province of China, Indonesia, UK, Canada and New Zealand. In the period 1994-96 the USA has been far and away the major exporting country of chondrichthyan products, but in 1997 its exports have shown a 23.4% decline reaching more than 9 200 tonnes. In the last few years there has been a considerable decline in the exports of Norway, UK and Japan, which were, until 1990, the top three exporting countries in the world for chondrichthyan products. Yet, in 1997 has increased its exports by 38.9% as compared to the previous year and ranked third as exporter by volume, and fourth in value, behind China, Spain and the USA. Statistics on Chinese elasmobranch exports and imports are only available from 1992. In 1997 its exports consisted of 13 tonnes of frozen sharks and 2 420 tonnes (worth US\$20.0 million) of dried and salted shark fins. China is the major exporter of shark fins by a long way, followed by Hong Kong, Indonesia, Japan, Taiwan Province of China and India.

Notwithstanding that Pakistan was the leading shark producing country in 1997, Pakistan reported no shark exports to FAO and on the previous years only very limited volumes, but none of cured sharks that represent almost the totality of its production and which are probably exported. Dried, salted and in-brine shark meat is included with other fish species. Local consumption of dried and salted sharks is not very high in Pakistan as has been confirmed by its delegate at the FAO expert consultation meeting on the management of fishing capacity, shark fisheries and incidental catch of seabirds in longline fisheries²⁷. He wrote: "Sharks, skates and rays etc. are generally not consumed locally. These are used for export purposes either in salted or frozen form. Hardly any stock assessment surveys or any research study has so far been carried out specifically on shark in the country".

Figure 24 Chondrichthyan exports by country in US\$ 1 million, 1976-1997



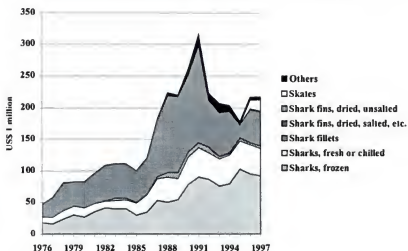
Source: FAO-FIDI

5.3 IMPORTS

In 1997 world chondrichthyan imports amounted to nearly 73 100 tonnes, worth US\$217.2 million, representing the peak year since 1976 (24 200 tonnes, US\$47.6 million). In 1997 frozen shark meat was the main imported product, 37 800 tonnes worth US\$91.4 million, followed by fresh or chilled shark meat with 14 400 tonnes, valued at US\$42.2 million. Imports of shark fins were more than 7 000 tonnes, worth US\$55.5 million (Table 13 and Table 14).

²⁷Statement from Pakistan for the expert consultation meeting of the FAO on the management of fishing capacity, shark fisheries and incidental catch of seabirds in longline fisheries (Rome, 26-30 October 1998).

Figure 25 Chondrichthyan imports by product form in US\$ 1 million, 1976-1997

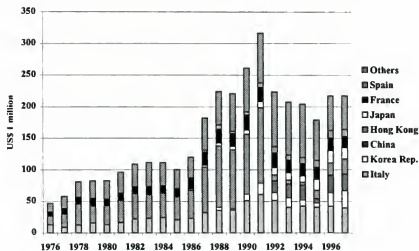


Source: FAO-FIDI

According to FAO statistics, in 1997 Italy was much the largest importer of chondrichthyan products, with nearly 14 400 tonnes valued at US\$39.9 million (Table 16 and Table 17). The greater part of its imports were frozen sharks, 12 010 tonnes worth US\$27.3 million. In 1997 other significant importers were Republic of Korea, France, Spain, China, UK, Hong Kong and Germany. France was the leading importer of fresh or chilled sharks, 3 800 tonnes, worth US\$12.2 million, followed by the USA, Italy, UK and Denmark. In 1997 the European Union represented the main importing area with 54.7% of the imports by volume and 44.9% in value.

In 1997 Republic of Korea was the second largest importer of *Elasmobranchii* in the world by volume and value with 14 400 tonnes, worth US\$27.0 million. Its imports were composed of more than 8 500 tonnes of frozen skates, 3 100 tonnes of *Elasmobranchii* not identified, 2 700 tonnes of frozen sharks and limited volumes of shark liver oil and dried, unsalted shark fins. China was the third largest importers of chondrichthyans by value with US\$26.5 million and the leading importer of shark fins with 4 400 tonnes, valued US\$24.8 million.

Figure 26 Chondrichthyan imports by country in US\$ 1 million, 1976-1997



Source: FAO - FIDI.

Table 6 World chondrichthyan production by product in tonnes

| PRODUCT | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Sharks, fresh or chilled | 2 | 43 | - | - | - | - | - | - | 3 | - | 14 |
| Sharks, frozen | 12 019 | 14 579 | 16 735 | 19 406 | 15 841 | 16 857 | 19 714 | 19 578 | 21 367 | 20 160 | 20 334 |
| Skates, frozen | 461 | 593 | 663 | 759 | 1 173 | 664 | 880 | 1 064 | 981 | 1 450 | 2 318 |
| Sharks, rays, chimaeras nei, frozen | - | - | - | - | - | - | - | - | - | - | 7 |
| Shark fillets, fresh or chilled | - | 1 257 | 1 087 | 1 285 | 1 170 | 11 | 248 | 86 | 312 | 523 | 928 |
| Shark fillets, frozen | 139 | 102 | 125 | 2 560 | 2 401 | 1 205 | 3 297 | 3 817 | 4 197 | 2 537 | 1 179 |
| Sharks, dried, salted or in brine | 4 713 | 5 963 | 4 096 | 4 112 | 1 531 | 8 503 | 9 367 | 9 079 | 6 796 | 5 938 | 7 076 |
| Sharks, rays, etc., dried, salted or in brine | 648 | 2 350 | 1 510 | 730 | 870 | 825 | 4 373 | 3 770 | 1 888 | 2 302 | 2 683 |
| Shark fins, dried, salted, etc. | 407 | 492 | 439 | 363 | 297 | 363 | 446 | 534 | 411 | 512 | 611 |
| Shark fins, dried, unsalted | 1 400 | 1 318 | 1 217 | 1 334 | 1 569 | 568 | 578 | 611 | 504 | 3 233 | 2 151 |
| Shark liver oil | 497 | 724 | 522 | 355 | 255 | 141 | 158 | 143 | 149 | 113 | 82 |
| Total | 20 286 | 27 421 | 26 394 | 30 904 | 25 107 | 29 137 | 39 061 | 38 682 | 36 608 | 36 781 | 37 383 |

| PRODUCT | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Sharks, fresh or chilled | 3 | - | - | 6 | - | 1 | - | 146 | - | 159 | 276 |
| Sharks, frozen | 21 231 | 28 028 | 22 067 | 24 352 | 31 065 | 37 348 | 40 416 | 37 606 | 40 324 | 34 068 | 37 558 |
| Skates, frozen | 2 783 | 2 184 | 2 076 | 12 871 | 26 471 | 5 731 | 6 577 | 6 218 | 3 632 | 3 200 | 3 043 |
| Sharks, rays, chimaeras nei, frozen | 13 | 840 | 383 | 577 | 947 | 707 | 1 354 | 125 | 401 | 290 | 1 630 |
| Shark fillets, fresh or chilled | 3 792 | 425 | 1 087 | 2 864 | 1 836 | 1 680 | 1 331 | 991 | 924 | 940 | 2 600 |
| Shark fillets, frozen | 787 | 2 629 | 2 000 | 2 626 | 3 434 | 7 483 | 8 066 | 8 833 | 8 302 | 5 968 | 4 181 |
| Sharks, dried, salted or in brine | 6 785 | 6 572 | 6 849 | 6 729 | 6 751 | 9 967 | 10 815 | 11 054 | 12 804 | 15 829 | 19 916 |
| Sharks, rays, etc., dried, salted or in brine | 4 532 | 3 655 | 5 047 | 4 379 | 488 | 388 | 2 270 | 523 | 569 | 60 | 140 |
| Shark fins, dried, salted, etc. | 863 | 1 284 | 4 624 | 4 190 | 3 021 | 3 452 | 3 581 | 3 351 | 3 722 | 2 915 | 3 092 |
| Shark fins, dried, unsalted | 1 343 | 4 108 | 1 799 | 1 592 | 1 373 | 1 048 | 2 714 | 900 | 1 005 | 1 142 | 2 938 |
| Shark liver oil | 45 | 42 | 31 | 35 | 53 | 41 | 31 | 39 | 1 | 11 | 4 |
| Total | 42 177 | 49 767 | 45 963 | 60 221 | 75 439 | 67 846 | 77 155 | 69 786 | 71 684 | 64 582 | 75 378 |

Source: FAO - FIDI.

Table 7 World chondrichthyan production by country in tonnes

| COUNTRY | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Pakistan | 4 267 | 4 669 | 3 200 | 3 311 | 1 322 | 7 129 | 7 750 | 8 218 | 4 125 | 4 323 | 5 170 |
| Spain | - | - | - | - | - | - | - | - | - | - | - |
| USA | - | 1 247 | 1 087 | 3 286 | 3 151 | 953 | 3 225 | 2 492 | 3 455 | 2 921 | 2 040 |
| Japan | 8 596 | 8 905 | 8 376 | 8 875 | 9 541 | 9 360 | 13 565 | 15 559 | 14 044 | 13 409 | 13 950 |
| Mexico | - | 1 823 | 4 383 | 5 877 | 3 028 | 3 920 | 2 702 | 1 613 | 2 630 | 3 309 | 2 404 |
| Taiwan PC | 443 | 454 | 435 | 388 | 263 | 217 | 206 | 175 | 152 | 2 808 | 1 655 |
| Indonesia | 277 | 87 | 134 | 186 | 179 | 225 | 249 | 334 | 232 | 329 | 444 |
| New Zealand | 68 | 75 | 46 | 517 | 416 | 263 | 243 | 196 | 146 | 72 | 51 |
| Chile | 8 | 14 | 31 | 342 | 784 | 529 | 249 | 257 | 276 | 593 | 815 |
| China | - | - | 1 | 8 | 3 | 9 | 40 | 40 | 31 | 35 | 91 |
| Korea Rep. | 61 | 114 | 252 | 95 | 167 | 78 | 49 | 98 | 82 | 50 | 35 |
| Canada | - | - | - | - | - | - | - | - | - | - | - |
| Uruguay | 722 | 341 | 315 | 11 | 5 | - | 235 | 196 | 828 | 308 | 422 |
| Argentina | 400 | 400 | - | - | - | - | - | - | - | - | - |
| UK | 836 | 1 687 | 2 113 | 1 863 | 1 656 | 1 189 | 1 331 | 615 | 996 | 1 727 | 788 |
| Peru | 360 | 695 | 599 | 772 | 1 047 | 2 008 | 1 820 | 1 118 | 1 577 | 964 | 2 383 |
| Portugal | - | - | - | - | - | - | - | - | - | - | 613 |
| Singapore | - | - | - | - | - | - | - | - | - | - | - |
| Norway | 2 651 | 2 767 | 1 837 | 2 941 | 969 | 550 | 430 | 444 | 505 | 675 | 490 |
| India | 104 | 143 | 154 | 190 | 163 | 212 | 112 | 105 | 144 | 96 | 115 |
| South Africa | 100 | 100 | 586 | 405 | 241 | 889 | 919 | 725 | 950 | 544 | 557 |
| Iceland | - | - | 200 | 100 | 100 | 108 | 127 | 136 | 95 | 104 | 80 |
| Denmark | 90 | 180 | 71 | 56 | 100 | 88 | 129 | 1 222 | 384 | 122 | 139 |
| Senegal | 4 | 76 | 241 | 193 | 142 | 91 | 4 | 15 | 37 | - | 7 |
| Colombia | 45 | 648 | 356 | 417 | 178 | 316 | 600 | 546 | 2 307 | 474 | 860 |
| Madagascar | - | - | - | - | - | - | - | - | - | - | - |
| Philippines | - | - | - | - | - | - | - | - | - | - | - |
| Maldives | 8 | 20 | 25 | 20 | 37 | 40 | 99 | 76 | 85 | 71 | 49 |
| Greece | - | - | - | - | - | - | 106 | 75 | 82 | 99 | 77 |
| Faeroe Is. | 279 | 198 | 126 | 175 | 527 | 254 | 312 | 380 | 373 | 291 | 411 |
| Hong Kong | 20 | 26 | 16 | 15 | 9 | 10 | 8 | 9 | 6 | 3 | 4 |
| Italy | - | - | - | - | - | - | 194 | 162 | 1 187 | 817 | 1 119 |
| Brazil | - | - | - | - | - | - | - | - | - | 170 | 141 |
| Fiji Is. | - | 40 | 56 | 32 | 54 | 42 | 41 | 8 | 8 | 11 | 10 |
| Sri Lanka | 61 | 61 | - | - | - | - | 3 582 | 3 116 | 726 | 676 | 707 |
| Ireland | - | - | - | - | - | - | - | 67 | 170 | 197 | 211 |
| Lithuania | - | - | - | - | - | - | - | - | - | - | - |
| Bangladesh | - | 58 | 68 | 36 | - | - | 31 | 48 | 49 | 48 | 50 |
| Australia | - | - | - | - | - | - | - | - | - | - | - |
| Guatemala | - | - | - | - | - | - | - | - | - | - | - |
| France | 197 | 207 | 139 | 158 | 204 | 60 | 73 | 88 | 93 | 236 | 275 |
| Thailand | 634 | 2 300 | 1 470 | 550 | 740 | 520 | 520 | 490 | 800 | 1 240 | 1 180 |
| Yemen | - | 51 | 77 | 82 | 81 | 74 | 105 | 55 | 33 | 59 | 40 |
| Côte d'Ivoire | 55 | 35 | - | 3 | - | 3 | 5 | 4 | - | - | - |
| Total | 20 286 | 27 421 | 26 394 | 30 904 | 25 107 | 29 137 | 39 061 | 38 682 | 36 608 | 36 781 | 37 383 |

Table 7 World chondrichthyan production by countries in tonnes (continued)

| COUNTRY | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Pakistan | 5 352 | 5 545 | 5 567 | 5 546 | 6 305 | 9 333 | 10 078 | 10 478 | 12 671 | 15 671 | 19 064 |
| Spain | - | - | - | - | - | 991 | 3 409 | 2 800 | 4 500 | 6 700 | 12 100 |
| USA | 4 489 | 2 413 | 2 989 | 6 643 | 6 908 | 12 961 | 11 305 | 12 189 | 14 973 | 12 748 | 10 169 |
| Japan | 13 562 | 14 658 | 10 015 | 8 094 | 10 416 | 11 796 | 12 197 | 10 718 | 6 852 | 7 464 | 8 401 |
| Mexico | 2 469 | 3 951 | 3 110 | 4 859 | 3 996 | 4 556 | 4 644 | 4 678 | 3 378 | 3 525 | 4 217 |
| Taiwan PC | 644 | 3 486 | 2 221 | 2 430 | 2 301 | 2 398 | 2 773 | 1 027 | 1 932 | 1 824 | 3 736 |
| Indonesia | 573 | 473 | 517 | 558 | 494 | 3 382 | 8 853 | 6 010 | 8 995 | 1 674 | 3 030 |
| New Zealand | 52 | 2 665 | 1 467 | 1 939 | 5 386 | 3 072 | 3 358 | 4 798 | 3 684 | 3 683 | 2 698 |
| Chile | 841 | 1 330 | 1 799 | 1 327 | 1 809 | 2 231 | 1 805 | 2 501 | 2 669 | 2 700 | 2 597 |
| China | 235 | 463 | 563 | 809 | 732 | 1 200 | 1 200 | 1 400 | 1 500 | 2 192 | 2 420 |
| Korea Rep. | 16 | 1 117 | 302 | 662 | 1 003 | 692 | 1 250 | 117 | 504 | 307 | 1 675 |
| Canada | - | 1 627 | 824 | 1 421 | 1 229 | 1 014 | 1 257 | 1 427 | 1 866 | 1 293 | 1 234 |
| Uruguay | 188 | 92 | 10 | 31 | 244 | 334 | 18 | 200 | 282 | 413 | 888 |
| Argentina | - | - | - | - | - | 864 | 1 210 | 1 392 | 958 | 920 | 669 |
| UK | 1 498 | 1 023 | 1 099 | 898 | 1 129 | 1 060 | 183 | 547 | 1 064 | 620 | 605 |
| Peru | 2 117 | 1 504 | 2 522 | 1 360 | 599 | 617 | 952 | 333 | 549 | 368 | 316 |
| Portugal | 1 654 | 982 | 397 | 11 308 | 23 301 | 1 483 | 1 933 | 1 735 | 853 | 258 | 263 |
| Singapore | - | 21 | 28 | 23 | - | 25 | - | - | - | - | 260 |
| Norway | 268 | 283 | 443 | 496 | 655 | 462 | 379 | 360 | 325 | 308 | 228 |
| India | 118 | 158 | 3 433 | 2 865 | 1 696 | 1 458 | 1 438 | 1 442 | 1 400 | 245 | 211 |
| South Africa | 881 | 697 | 884 | 1 356 | 284 | 284 | 192 | 279 | 124 | 218 | 201 |
| Iceland | - | - | 5 | 25 | 6 | 75 | 515 | 9 | 36 | 17 | 93 |
| Denmark | 218 | 346 | 439 | 180 | 221 | 260 | 184 | 116 | 42 | 76 | 83 |
| Senegal | 71 | - | - | 35 | 294 | 93 | 65 | 50 | 524 | 443 | 43 |
| Colombia | 685 | 475 | 645 | 618 | 245 | 545 | 223 | 200 | 131 | 140 | 40 |
| Madagascar | 3 | 14 | 12 | 7 | 15 | 29 | 105 | 48 | 24 | 14 | 38 |
| Philippines | - | - | - | - | 9 | 36 | 33 | 13 | 36 | 42 | 34 |
| Maldives | 60 | 40 | 31 | 40 | 53 | 52 | 29 | 17 | 18 | 31 | 31 |
| Greece | 133 | 121 | 108 | 87 | 64 | 131 | 75 | 64 | 102 | 87 | 24 |
| Faeroe Is. | 369 | 336 | 398 | 335 | 956 | 817 | 719 | 48 | 26 | 41 | 10 |
| Hong Kong | 4 | 4 | 3 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 |
| Italy | 1 410 | 1 640 | 1 875 | 2 091 | 4 232 | 4 856 | 4 116 | 4 116 | 334 | 250 | - |
| Brazil | 176 | 217 | 165 | 161 | 190 | 277 | 373 | 235 | 233 | 192 | - |
| Fiji Is. | 6 | 25 | 14 | 24 | 21 | 69 | 17 | 5 | 110 | 62 | - |
| Sri Lanka | 245 | 250 | 275 | 260 | 254 | 283 | 1 979 | 350 | 404 | 48 | - |
| Ireland | 298 | 214 | 134 | - | 27 | 36 | - | - | 40 | 8 | - |
| Lithuania | - | - | - | - | - | - | - | 16 | 330 | - | - |
| Bangladesh | 28 | 31 | 61 | 47 | 78 | 65 | 238 | 45 | 212 | - | - |
| Australia | - | - | 7 | 10 | 273 | 5 | 24 | 5 | 3 | - | - |
| Guatemala | - | - | - | - | - | - | 25 | 18 | - | - | - |
| France | 69 | 46 | 41 | 9 | 13 | 2 | - | - | - | - | - |
| Thailand | 3 361 | 3 450 | 3 500 | 3 500 | - | - | - | - | - | - | - |
| Yemen | 84 | 70 | 60 | 166 | - | - | - | - | - | - | - |
| Côte d'Ivoire | - | - | - | - | - | - | - | - | - | - | - |
| Total | 42 177 | 49 767 | 45 963 | 60 221 | 75 439 | 67 846 | 77 155 | 69 786 | 71 684 | 64 582 | 75 378 |

Source: FAO - FIDI.

Table 8 World chondrichthyan exports by product in tonnes

| PRODUCT | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | 2 999 | 2 824 | 3 103 | 2 413 | 2 100 | 1 365 | 1 322 | 1 688 | 1 499 | 1 382 | 1 346 |
| Sharks, fresh or chilled | 4 686 | 4 906 | 5 403 | 5 001 | 4 039 | 4 180 | 3 891 | 6 181 | 9 029 | 14 932 | 15 065 |
| Skates, fresh or chilled | 87 | 69 | 53 | 95 | 116 | 87 | 69 | 87 | 117 | 169 | 165 |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | 1 | 6 | - | 9 | 336 | 19 | 125 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, frozen | 5 742 | 5 895 | 6 620 | 6 486 | 6 282 | 7 951 | 7 389 | 7 379 | 8 759 | 5 889 | 6 534 |
| Skates, frozen | 264 | 388 | 331 | 336 | 518 | 332 | 266 | 417 | 443 | 704 | 593 |
| Sharks, rays, chimaeras nei, frozen | 661 | 336 | 488 | 347 | 303 | 401 | 339 | 508 | 845 | 704 | 597 |
| Shark fillets, fresh or chilled | 31 | 175 | - | 3 | 18 | 4 | 20 | 1 | 1 | - | - |
| Dogfish (<i>Squalus</i> spp.) filets, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Shark fillets, frozen | 3 099 | 1 972 | 2 447 | 4 319 | 2 697 | 2 860 | 3 405 | 4 624 | 3 932 | 2 116 | 3 255 |
| Sharks, rays, chimaeras, etc, fillets, frozen | 5 | 4 | 4 | 13 | 7 | 4 | 8 | 4 | 1 | 4 | 20 |
| Sharks, dried, salted or in brine | 25 | 46 | 3 | 9 | - | - | - | - | - | - | - |
| Sharks, rays, etc., dried, salted or in brine | - | - | - | - | - | - | - | - | - | - | - |
| Shark fins, dried, salted, etc. | 1 282 | 1 331 | 1 836 | 1 334 | 1 765 | 1 794 | 1 952 | 2 045 | 1 962 | 1 893 | 2 118 |
| Shark fins, dried, unsalted | 1 384 | 1 252 | 1 303 | 1 335 | 1 243 | 1 486 | 1 435 | 2 204 | 1 763 | 1 338 | 1 363 |
| Shark liver oil | 5 | 0 | 6 | 9 | 9 | 25 | 79 | 79 | 302 | 992 | 31 |
| Total | 20 270 | 19 198 | 21 597 | 21 700 | 19 098 | 20 497 | 20 175 | 25 226 | 28 989 | 30 209 | 31 213 |

Table 8 World chondrichthyan exports by product in tonnes (continued)

| PRODUCT | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | 1 823 | 2 426 | 3 408 | 6 173 | 6 332 | 4 588 | 4 698 | 3 033 | 4 077 | 3 599 | 2 100 |
| Sharks, fresh or chilled | 17 900 | 15 939 | 10 387 | 11 860 | 12 079 | 11 911 | 16 928 | 17 286 | 13 878 | 14 663 | 13 165 |
| Skates, fresh or chilled | 222 | 78 | 33 | 39 | 40 | 153 | 295 | 440 | 830 | 925 | 933 |
| Sharks, rays, skates, fresh or chilled, nei | 12 | - | 10 | 252 | 1 563 | 2 829 | 1 357 | 1 167 | 600 | 324 | 737 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | 705 | 1 443 | 1 196 |
| Sharks, frozen | 7 906 | 10 261 | 10 066 | 14 191 | 20 891 | 21 745 | 26 149 | 24 382 | 34 406 | 28 368 | 34 974 |
| Skates, frozen | 337 | 215 | 338 | 338 | 490 | 383 | 344 | 326 | 275 | 314 | 329 |
| Sharks, rays, chimaeras nei, frozen | 452 | 1 529 | 1 503 | 1 477 | 1 856 | 864 | 1 354 | 125 | 401 | 290 | 1 640 |
| Shark fillets, fresh or chilled | 42 | 128 | 20 | 8 | 88 | 93 | 101 | 105 | 64 | 96 | 109 |
| Dogfish (<i>Squalus</i> spp.) fillets, frozen | - | - | - | - | - | - | - | - | 54 | - | - |
| Shark fillets, frozen | 3 490 | 4 570 | 4 406 | 4 177 | 3 728 | 3 637 | 3 413 | 3 210 | 2 661 | 3 013 | 3 076 |
| Sharks, rays, chimaeras, etc. fillets, frozen | 26 | 5 | 1 | 15 | 72 | 127 | 121 | 127 | 358 | 430 | 316 |
| Sharks, dried, salted or in brine | 6 | 8 | 1 | 1 | 20 | 1 | - | - | - | - | - |
| Sharks, rays, etc., dried, salted or in brine | 2 | 22 | - | - | - | - | - | - | - | - | - |
| Shark fins, dried, salted, etc. | 2 887 | 3 230 | 4 122 | 3 258 | 3 749 | 3 688 | 3 722 | 3 579 | 2 117 | 4 850 | 5 170 |
| Shark fins, dried, unsalted | 1 452 | 1 292 | 1 359 | 1 083 | 1 033 | 945 | 933 | 1 080 | 943 | 1 351 | 1 097 |
| Shark liver oil | 36 | 429 | 18 | 29 | 214 | 234 | 113 | 66 | 129 | 100 | 137 |
| Total | 36 593 | 40 132 | 35 672 | 42 901 | 52 155 | 51 198 | 59 528 | 54 926 | 61 498 | 59 766 | 64 979 |

Source: FAO - FIDI.

Table 9 World chondrichthyan exports by product in US\$ 1 000

| PRODUCT | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | 3 703 | 3 681 | 4 695 | 4 581 | 4 951 | 2 823 | 2 311 | 2 334 | 1 956 | 1 454 | 2 163 |
| Sharks, fresh or chilled | 5 408 | 5 767 | 7 755 | 9 068 | 9 134 | 8 597 | 7 143 | 9 588 | 11 686 | 16 927 | 25 995 |
| Skates, fresh or chilled | 87 | 75 | 66 | 129 | 160 | 140 | 110 | 128 | 127 | 159 | 193 |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | 2 | 14 | 1 | 6 | 201 | 421 | 193 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, frozen | 6 687 | 7 613 | 10 208 | 11 614 | 14 194 | 19 688 | 19 037 | 18 156 | 19 874 | 10 033 | 16 631 |
| Skates, frozen | 229 | 306 | 316 | 379 | 689 | 464 | 362 | 532 | 379 | 478 | 654 |
| Sharks, rays, chimaeras nei, frozen | 494 | 290 | 525 | 492 | 454 | 478 | 399 | 556 | 702 | 546 | 459 |
| Shark fillets, fresh or chilled | 51 | 302 | - | 7 | 46 | 14 | 106 | 53 | 3 | 1 | - |
| Dogfish (<i>Squalus</i> spp.) fillets, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Shark fillets, frozen | 5 403 | 3 512 | 5 060 | 9 790 | 6 730 | 6 491 | 8 839 | 11 545 | 10 572 | 3 746 | 8 676 |
| Sharks, rays, chimaeras, etc. fillets, frozen | 3 | 4 | 3 | 6 | 16 | 3 | 8 | 3 | 1 | 3 | 35 |
| Sharks, dried, salted or in brine | 11 | 58 | 2 | 9 | - | 41 | - | - | - | - | - |
| Sharks, rays, etc., dried, salted or in brine | - | - | - | - | - | - | - | - | - | 95 | 4 |
| Shark fins, dried, salted, etc. | 5 473 | 8 012 | 9 376 | 10 559 | 16 435 | 20 511 | 25 159 | 28 111 | 26 984 | 25 562 | 26 600 |
| Shark fins, dried, unsalted | 7 491 | 11 246 | 12 563 | 11 973 | 11 839 | 15 415 | 15 208 | 14 954 | 15 307 | 13 030 | 13 571 |
| Shark liver oil | 3 | 0 | 20 | 10 | 15 | 88 | 278 | 413 | 1 127 | 5 004 | 174 |
| Total | 35 043 | 40 866 | 50 589 | 58 617 | 64 665 | 74 767 | 78 961 | 86 379 | 88 919 | 77 459 | 95 348 |

Table 9 World chondrichthyan exports by product in US\$ 1 000 (continued)

| PRODUCT | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | 2 968 | 3 641 | 4 198 | 7 830 | 9 072 | 6 769 | 6 925 | 4 656 | 7 123 | 6 647 | 4 090 |
| Sharks, fresh or chilled | 36 062 | 35 685 | 28 579 | 36 879 | 36 903 | 36 009 | 44 131 | 43 276 | 35 422 | 36 910 | 33 055 |
| Skates, fresh or chilled | 291 | 58 | 27 | 35 | 78 | 196 | 453 | 837 | 1 595 | 2 071 | 1 957 |
| Sharks, rays, skates, fresh or chilled, nei | 18 | - | 20 | 140 | 1 124 | 2 425 | 2 549 | 2 494 | 1 538 | 1 078 | 2 025 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | 833 | 1 788 | 1 364 |
| Sharks, frozen | 25 078 | 23 769 | 24 510 | 39 146 | 54 109 | 50 983 | 49 621 | 48 513 | 72 636 | 70 112 | 73 648 |
| Skates, frozen | 465 | 289 | 448 | 497 | 661 | 542 | 515 | 639 | 726 | 669 | 543 |
| Sharks, rays, chimaeras nei, frozen | 301 | 1 363 | 2 488 | 1 964 | 3 540 | 1 850 | 1 629 | 409 | 454 | 351 | 1 821 |
| Shark filelets, fresh or chilled | 149 | 544 | 65 | 36 | 336 | 398 | 284 | 405 | 281 | 482 | 356 |
| Dogfish (<i>Squalus</i> spp.) filelets, frozen | - | - | - | - | - | - | - | - | 115 | - | - |
| Shark filelets, frozen | 12 659 | 14 041 | 13 774 | 16 909 | 18 979 | 16 535 | 13 036 | 13 392 | 10 859 | 13 319 | 11 955 |
| Sharks, rays, chimaeras, etc. filelets, frozen | 60 | 11 | 2 | 29 | 192 | 355 | 302 | 305 | 848 | 1 079 | 643 |
| Sharks, dried, salted or in brine | 19 | 129 | 19 | 11 | 384 | 4 | - | - | - | - | - |
| Sharks, rays, etc., dried, salted or in brine | 15 | 29 | - | - | - | - | - | - | - | - | - |
| Shark fins, dried, salted, etc. | 43 885 | 55 080 | 53 066 | 50 288 | 62 222 | 68 808 | 66 584 | 76 726 | 26 327 | 56 580 | 65 373 |
| Shark fins, dried, unsalted | 19 485 | 24 468 | 26 794 | 22 501 | 26 191 | 37 562 | 29 559 | 26 040 | 30 996 | 29 019 | 24 999 |
| Shark liver oil | 114 | 1 376 | 150 | 216 | 1 688 | 2 009 | 899 | 515 | 1 088 | 766 | 1 244 |
| Total | 141 569 | 160 483 | 154 140 | 176 481 | 215 479 | 224 445 | 216 487 | 218 207 | 190 841 | 220 871 | 223 073 |

Source: FAO - FIDI.

Table 10 World chondrichthyan exports by product: unit value, US\$/kg

| PRODUCT | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | 1.23 | 1.30 | 1.51 | 1.90 | 2.36 | 2.07 | 1.75 | 1.38 | 1.30 | 1.05 | 1.61 |
| Sharks, fresh or chilled | 1.15 | 1.18 | 1.44 | 1.81 | 2.26 | 2.06 | 1.84 | 1.55 | 1.29 | 1.13 | 1.73 |
| Skates, fresh or chilled | 1.00 | 1.09 | 1.25 | 1.36 | 1.38 | 1.61 | 1.59 | 1.47 | 1.09 | 0.94 | 1.17 |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | 2.00 | 2.33 | - | 0.67 | 0.60 | 22.16 | 1.54 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, frozen | 1.16 | 1.29 | 1.54 | 1.79 | 2.26 | 2.48 | 2.58 | 2.46 | 2.27 | 1.70 | 2.55 |
| Skates, frozen | 0.87 | 0.79 | 0.95 | 1.13 | 1.33 | 1.40 | 1.36 | 1.28 | 0.86 | 0.68 | 1.10 |
| Sharks, rays, chimaeras nei, frozen | 0.75 | 0.86 | 1.08 | 1.42 | 1.50 | 1.19 | 1.18 | 1.09 | 0.83 | 0.78 | 0.77 |
| Shark fillets, fresh or chilled | 1.65 | 1.73 | - | 2.33 | 2.56 | 3.50 | 5.30 | 53.00 | 3.00 | - | - |
| Dogfish (<i>Squalus</i> spp.) fillets, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Shark fillets, frozen | 1.74 | 1.78 | 2.07 | 2.27 | 2.50 | 2.27 | 2.60 | 2.50 | 2.69 | 1.77 | 2.67 |
| Sharks, rays, chimaeras, etc. fillets, frozen | 0.60 | 1.00 | 0.75 | 0.46 | 2.29 | 0.75 | 1.00 | 0.75 | 1.00 | 0.75 | 1.75 |
| Sharks, dried, salted or in brine | 0.44 | 1.26 | 0.67 | 1.00 | - | 20.50 | - | - | - | - | - |
| Sharks, rays, etc., dried, salted or in brine | - | - | - | - | - | - | - | - | - | 1.42 | 4.00 |
| Shark fins, dried, salted, etc. | 4.27 | 6.02 | 5.11 | 7.92 | 9.31 | 11.43 | 12.89 | 13.75 | 13.75 | 13.50 | 12.56 |
| Shark fins, dried, unsalted | 5.41 | 8.98 | 9.64 | 8.97 | 9.52 | 10.37 | 10.60 | 6.78 | 8.68 | 9.74 | 9.96 |
| Shark liver oil | 0.60 | - | 3.33 | 1.11 | 1.67 | 3.52 | 3.52 | 5.23 | 3.73 | 5.04 | 5.61 |

Table 10 World chondrichthyan exports by product: unit value, US\$/kg (continued)

| PRODUCT | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | 1.63 | 1.50 | 1.23 | 1.27 | 1.43 | 1.48 | 1.47 | 1.54 | 1.75 | 1.85 | 1.95 |
| Sharks, fresh or chilled | 2.01 | 2.24 | 2.75 | 3.11 | 3.06 | 3.02 | 2.61 | 2.50 | 2.55 | 2.52 | 2.51 |
| Skates, fresh or chilled | 1.31 | 0.74 | 0.82 | 0.90 | 1.95 | 1.28 | 1.54 | 1.90 | 1.92 | 2.24 | 2.10 |
| Sharks, rays, skates, fresh or chilled, nei | 1.50 | - | 2.00 | 0.56 | 0.72 | 0.86 | 1.88 | 2.14 | 2.56 | 3.33 | 2.75 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | 1.18 | 1.24 | 1.14 |
| Sharks, frozen | 3.17 | 2.32 | 2.43 | 2.76 | 2.59 | 2.34 | 1.90 | 1.99 | 2.11 | 2.47 | 2.11 |
| Skates, frozen | 1.38 | 1.34 | 1.33 | 1.47 | 1.35 | 1.42 | 1.50 | 1.96 | 2.64 | 2.13 | 1.65 |
| Sharks, rays, chimaeras nei, frozen | 0.67 | 0.89 | 1.66 | 1.33 | 1.91 | 2.14 | 1.20 | 3.27 | 1.13 | 1.21 | 1.11 |
| Shark fillets, fresh or chilled | 3.55 | 4.25 | 3.25 | 4.50 | 3.82 | 4.28 | 2.81 | 3.86 | 4.39 | 5.02 | 3.27 |
| Dogfish (<i>Squalus</i> spp.) fillets, frozen | - | - | - | - | - | - | - | - | 2.13 | - | - |
| Shark fillets, frozen | 3.63 | 3.07 | 3.13 | 4.05 | 5.09 | 4.55 | 3.82 | 4.17 | 4.08 | 4.42 | 3.89 |
| Sharks, rays, chimaeras, etc. fillets, frozen | 2.31 | 2.20 | 2.00 | 1.93 | 2.67 | 2.80 | 2.50 | 2.40 | 2.37 | 2.51 | 2.03 |
| Sharks, dried, salted or in brine | 3.17 | 16.13 | 19.00 | 11.00 | 19.20 | 4.00 | - | - | - | - | - |
| Sharks, rays, etc., dried, salted or in brine | 7.50 | 1.32 | - | - | - | - | - | - | - | - | - |
| Shark fins, dried, salted, etc. | 15.20 | 17.05 | 12.87 | 15.44 | 16.60 | 18.66 | 17.89 | 21.44 | 12.44 | 11.67 | 12.64 |
| Shark fins, dried, unsalted | 13.42 | 18.94 | 19.72 | 20.78 | 25.35 | 39.75 | 31.68 | 24.11 | 32.87 | 21.48 | 22.79 |
| Shark liver oil | 3.17 | 3.21 | 8.33 | 7.45 | 7.89 | 8.59 | 7.96 | 7.80 | 8.43 | 7.66 | 9.08 |

Source: FAO - FIDI.

Table 11 World chondrichthyan exports by country in tonnes

| COUNTRY | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Spain | - | - | - | - | - | 1 | 38 | 63 | 53 | 90 | 175 |
| USA | - | - | - | - | - | - | - | - | - | - | - |
| Japan | 5 382 | 3 299 | 3 825 | 6 139 | 4 366 | 5 000 | 5 355 | 5 757 | 6 237 | 3 836 | 5 134 |
| Taiwan PC | 1 286 | 1 817 | 1 693 | 1 407 | 1 039 | 886 | 986 | 685 | 593 | 837 | 824 |
| Indonesia | 277 | 87 | 134 | 186 | 179 | 225 | 249 | 334 | 232 | 329 | 444 |
| UK | 2 491 | 2 754 | 2 569 | 2 315 | 2 053 | 1 841 | 1 436 | 2 553 | 4 750 | 6 883 | 6 944 |
| Canada | - | - | - | - | - | - | - | - | - | - | - |
| New Zealand | 198 | 296 | 374 | 517 | 416 | 263 | 243 | 196 | 146 | 72 | 51 |
| China | - | - | - | - | - | - | - | - | - | - | - |
| Hong Kong | 238 | 280 | 201 | 204 | 283 | 338 | 361 | 408 | 397 | 427 | 596 |
| Ecuador | - | - | - | - | - | 54 | 115 | 172 | 272 | 319 | 661 |
| Portugal | - | - | - | - | - | - | - | 16 | 231 | 940 | 83 |
| Korea Rep. | 165 | 152 | 147 | 170 | 94 | 89 | 80 | 55 | 44 | 46 | 79 |
| Norway | 6 109 | 6 075 | 5 330 | 4 097 | 3 237 | 2 068 | 1 859 | 2 234 | 2 148 | 2 218 | 1 919 |
| Singapore | 487 | 372 | 459 | 481 | 600 | 667 | 663 | 758 | 655 | 638 | 731 |
| France | 211 | 85 | 333 | 458 | 428 | 1 428 | 1 162 | 1 551 | 1 698 | 1 546 | 1 724 |
| Germany | 139 | 280 | 862 | 884 | 1 525 | 3 069 | 3 599 | 3 162 | 3 272 | 1 329 | 1 986 |
| Uruguay | 691 | 360 | 408 | 138 | 17 | 115 | 180 | 196 | 544 | 657 | 532 |
| Netherlands | - | 310 | 523 | 357 | 113 | 278 | 200 | 115 | 246 | 140 | 120 |
| Denmark | 1 332 | 1 748 | 2 027 | 2 040 | 1 697 | 1 627 | 1 459 | 2 503 | 1 565 | 1 564 | 1 456 |
| Argentina | - | - | - | - | - | - | - | - | - | - | - |
| Costa Rica | - | - | - | - | - | - | - | - | 14 | - | - |
| Mexico | 85 | 125 | 281 | 137 | 133 | 142 | 181 | 177 | 176 | 196 | 274 |
| Iceland | 13 | 9 | 16 | 113 | 18 | 19 | 15 | 6 | 20 | 5 | 20 |
| India | 104 | 143 | 154 | 190 | 163 | 212 | 112 | 105 | 144 | 96 | 115 |
| Ireland | - | - | - | 6 | - | - | - | 1 457 | 2 540 | 5 838 | 4 809 |
| Faeroe Is. | 279 | 198 | 126 | 175 | 527 | 272 | 343 | 380 | 708 | 291 | 411 |
| Italy | 175 | 67 | 1 | 386 | 261 | 103 | 106 | 142 | 109 | 110 | 268 |
| Chile | - | - | 114 | 240 | 479 | 597 | 107 | 230 | 756 | 576 | 494 |
| Sao Tome and Princ. | - | - | - | - | - | - | - | - | - | - | - |
| South Africa | - | - | - | - | - | - | - | - | - | - | - |
| Guinea-Bissau | - | - | - | - | - | - | - | - | - | - | - |
| Sweden | 106 | 164 | 926 | 600 | 434 | 244 | 387 | 233 | 160 | 219 | 316 |
| Belgium | 85 | 41 | 64 | 113 | 78 | 55 | 59 | 34 | 86 | 88 | 62 |
| Turkey | - | - | - | - | - | - | - | - | - | 290 | 354 |
| Guinea | - | - | - | - | - | - | - | - | - | - | - |
| Malaysia | 16 | 5 | 16 | 11 | 13 | 2 | 3 | 40 | 2 | 5 | 6 |
| Viet Nam | - | - | - | - | - | 8 | 48 | 111 | 82 | 54 | 32 |
| Sierra Leone | - | - | - | - | - | - | - | - | - | - | - |
| Angola | - | - | - | - | - | - | - | - | - | - | - |
| Madagascar | 5 | 3 | 2 | 2 | 6 | - | - | - | - | - | - |
| Mauritius | - | - | - | - | - | - | - | - | - | - | - |
| Thailand | 17 | 8 | - | 15 | 34 | 49 | 68 | 33 | 21 | 22 | 37 |
| Brazil | - | - | - | - | 93 | 97 | 115 | 117 | 130 | 170 | 141 |
| Maldives | 8 | 20 | 25 | 20 | 36 | 40 | 99 | 76 | 85 | 71 | 49 |
| Senegal | 5 | 76 | 241 | 21 | 102 | 55 | 10 | 19 | 54 | - | 22 |
| Others | 366 | 424 | 746 | 278 | 674 | 653 | 537 | 1 308 | 819 | 307 | 344 |
| Total | 20 270 | 19 198 | 21 597 | 21 700 | 19 098 | 20 497 | 20 175 | 25 226 | 28 989 | 30 209 | 31 213 |

Table 11 World chondrichthyan exports by country in tonnes (continued)

| COUNTRY | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Spain | 337 | 107 | 24 | 165 | 287 | 618 | 2 656 | 2 949 | 4 675 | 6 978 | 12 390 |
| USA | - | - | 517 | 3 029 | 3 710 | 6 716 | 6 980 | 8 278 | 11 359 | 12 063 | 9 241 |
| Japan | 5 532 | 4 883 | 4 775 | 4 550 | 3 782 | 3 444 | 3 028 | 2 787 | 1 978 | 2 589 | 3 597 |
| Taiwan PC | 995 | 913 | 2 354 | 2 856 | 2 641 | 2 604 | 2 244 | 2 268 | 3 976 | 3 316 | 3 076 |
| Indonesia | 573 | 473 | 516 | 798 | 1 932 | 6 209 | 9 824 | 6 573 | 9 049 | 1 674 | 3 047 |
| UK | 7 982 | 6 664 | 5 373 | 5 007 | 5 603 | 5 403 | 3 048 | 3 638 | 3 036 | 2 995 | 2 964 |
| Canada | - | 2 556 | 909 | 3 102 | 2 611 | 2 085 | 1 890 | 2 729 | 3 832 | 3 423 | 2 844 |
| New Zealand | 52 | 2 665 | 1 474 | 1 946 | 5 389 | 3 092 | 3 387 | 4 804 | 3 679 | 3 714 | 2 731 |
| China | - | - | - | - | - | 1 228 | 1 309 | 1 429 | 83 | 2 276 | 2 433 |
| Hong Kong | 846 | 1 208 | 1 434 | 1 609 | 1 958 | 467 | 309 | 412 | 916 | 1 794 | 1 955 |
| Ecuador | 1 547 | 1 677 | 1 295 | 1 368 | 2 428 | 1 958 | 2 447 | 2 320 | 1 652 | 2 397 | 1 873 |
| Portugal | 25 | 685 | 295 | 754 | 575 | 780 | 1 184 | 426 | 585 | 949 | 1 758 |
| Korea Rep. | 60 | 1 146 | 325 | 724 | 1 075 | 708 | 1 263 | 111 | 523 | 331 | 1 681 |
| Norway | 2 201 | 2 731 | 3 859 | 6 703 | 7 009 | 5 074 | 5 128 | 3 415 | 3 533 | 2 809 | 1 658 |
| Singapore | 1 084 | 871 | 1 519 | 806 | 794 | 939 | 824 | 994 | 1 872 | 1 634 | 1 566 |
| France | 1 837 | 1 897 | 1 367 | 1 116 | 611 | 393 | 2 740 | 2 342 | 1 022 | 1 392 | 1 555 |
| Germany | 1 775 | 1 470 | 1 923 | 2 510 | 2 686 | 1 884 | 2 011 | 1 359 | 1 382 | 1 129 | 1 373 |
| Uruguay | 227 | 58 | 54 | 58 | 43 | 164 | 3 | 364 | 561 | 967 | 1 346 |
| Netherlands | 105 | 112 | 198 | 113 | 119 | 83 | 859 | 178 | 259 | 241 | 1 068 |
| Denmark | 1 776 | 2 226 | 1 948 | 1 680 | 1 801 | 1 549 | 1 965 | 1 339 | 1 177 | 1 048 | 893 |
| Argentina | - | - | - | - | 968 | 865 | 1 210 | 1 392 | 991 | 931 | 681 |
| Costa Rica | - | - | - | - | - | - | - | 432 | 440 | 325 | 616 |
| Mexico | 199 | 138 | 130 | 143 | 262 | 590 | 739 | 865 | 568 | 781 | 570 |
| Iceland | 29 | 30 | 43 | 68 | 129 | 226 | 217 | 205 | 524 | 581 | 466 |
| India | 118 | 158 | 4 | 111 | - | - | 1 | - | 2 | 40 | 386 |
| Ireland | 6 374 | 4 009 | 1 200 | 128 | 268 | 260 | 666 | 567 | 496 | 395 | 353 |
| Faeroe Is. | 376 | - | - | 321 | 1 040 | 857 | 836 | 212 | 195 | 328 | 347 |
| Italy | 50 | 63 | 129 | 76 | 106 | 95 | 132 | 189 | 240 | 242 | 284 |
| Chile | 819 | 1 359 | 1 969 | 1 616 | 2 120 | 637 | 392 | 413 | 253 | 177 | 275 |
| Sao Tome and Prine. | - | - | - | - | - | - | - | - | - | - | 273 |
| South Africa | - | - | - | 142 | 234 | 234 | 192 | 279 | 246 | 218 | 218 |
| Guinea-Bissau | - | - | - | - | - | - | - | - | 97 | 43 | 216 |
| Sweden | 471 | 399 | 329 | 235 | 224 | 176 | 134 | 69 | 338 | 329 | 186 |
| Belgium | 59 | 64 | 50 | 58 | 32 | 23 | 48 | 194 | 53 | 111 | 124 |
| Turkey | 334 | 543 | 309 | 173 | 14 | 22 | 158 | 116 | 76 | 59 | 95 |
| Guinea | - | - | - | - | - | - | - | - | - | 11 | 93 |
| Malaysia | 19 | 2 | 1 | 5 | 40 | 50 | 38 | 26 | 55 | 49 | 66 |
| Viet Nam | 17 | 36 | 20 | 31 | 22 | 27 | - | - | 19 | 56 | 55 |
| Sierra Leone | - | - | - | - | - | - | - | - | - | - | 42 |
| Angola | - | - | - | - | - | - | - | - | 5 | 5 | 41 |
| Madagascar | 3 | 14 | 12 | 7 | 15 | 37 | 110 | 51 | 26 | 14 | 38 |
| Mauritius | - | - | - | - | - | 2 | - | 0 | 115 | 88 | 38 |
| Thailand | 37 | 52 | 35 | 27 | 28 | 88 | 22 | 137 | 82 | 225 | 37 |
| Brazil | 176 | 217 | 245 | 371 | 346 | 500 | 373 | 407 | 289 | 220 | 37 |
| Maldives | 60 | 40 | 31 | 40 | 53 | 52 | 29 | 17 | 18 | 25 | 31 |
| Senegal | 39 | 137 | 308 | 50 | 191 | 93 | 65 | - | 42 | 19 | 15 |
| Others | 459 | 529 | 698 | 405 | 1 009 | 966 | 1 067 | 640 | 1 179 | 775 | 347 |
| Total | 36 593 | 40 132 | 35 672 | 42 901 | 52 155 | 51 198 | 59 528 | 54 926 | 61 498 | 59 766 | 64 979 |

Source: FAO - FIDI

Table 12 World chondrichthyan exports by country in US\$ 1 000

| COUNTRY | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| China | - | - | - | - | - | - | - | - | - | - | - |
| Spain | - | - | - | - | - | 5 | 126 | 158 | 147 | 305 | 949 |
| USA | - | - | - | - | - | - | - | - | - | - | - |
| Japan | 12 987 | 13 206 | 15 583 | 20 195 | 16 945 | 20 065 | 21 560 | 21 224 | 22 802 | 15 149 | 20 493 |
| Hong Kong | 2 271 | 3 486 | 3 331 | 3 863 | 4 339 | 5 262 | 6 150 | 7 859 | 8 526 | 9 270 | 8 041 |
| Indonesia | 177 | 63 | 155 | 202 | 259 | 363 | 497 | 600 | 797 | 677 | 1 048 |
| Taiwan PC | 1 150 | 818 | 806 | 851 | 794 | 642 | 653 | 524 | 462 | 507 | 563 |
| UK | 2 745 | 3 815 | 4 320 | 4 616 | 4 829 | 3 318 | 2 368 | 3 367 | 5 541 | 7 763 | 11 957 |
| New Zealand | 337 | 673 | 930 | 1 222 | 1 305 | 857 | 686 | 507 | 495 | 222 | 124 |
| France | 238 | 160 | 676 | 1 219 | 1 512 | 4 641 | 3 783 | 5 104 | 5 085 | 4 808 | 6 948 |
| Singapore | 1 307 | 1 085 | 1 431 | 2 259 | 3 388 | 4 652 | 5 471 | 4 749 | 5 026 | 6 866 | 10 362 |
| Netherlands | - | 533 | 1 074 | 753 | 324 | 746 | 351 | 185 | 570 | 221 | 340 |
| Canada | - | - | - | - | - | - | - | - | - | - | - |
| Denmark | 2 156 | 3 054 | 4 629 | 5 337 | 5 588 | 4 678 | 3 702 | 5 325 | 3 503 | 3 304 | 4 647 |
| Germany | 176 | 496 | 1 236 | 2 141 | 5 309 | 10 580 | 12 140 | 11 115 | 11 283 | 4 696 | 9 448 |
| Norway | 7 335 | 7 424 | 8 030 | 7 342 | 6 845 | 3 927 | 3 126 | 3 118 | 2 702 | 2 223 | 2 836 |
| Ecuador | - | - | - | - | - | 748 | 749 | 333 | 452 | 610 | 893 |
| Portugal | - | - | - | - | - | - | - | 74 | 788 | 4 726 | 90 |
| Korea Rep. | 997 | 1 355 | 1 454 | 1 501 | 824 | 783 | 803 | 633 | 456 | 512 | 899 |
| India | 656 | 1 220 | 1 683 | 1 454 | 1 927 | 2 435 | 1 611 | 2 033 | 1 926 | 1 048 | 1 282 |
| Uruguay | 563 | 348 | 415 | 161 | 17 | 101 | 295 | 586 | 1 105 | 885 | 688 |
| Senegal | 3 | 51 | 174 | 59 | 43 | 84 | 12 | 311 | 350 | - | 35 |
| Costa Rica | - | - | - | - | - | - | - | - | 131 | - | - |
| Thailand | 45 | 55 | - | 293 | 630 | 1 061 | 1 433 | 1 021 | 389 | 647 | 1 102 |
| Argentina | - | - | - | - | - | - | - | - | - | - | - |
| Iceland | 11 | 8 | 15 | 101 | 38 | 20 | 26 | 6 | 9 | 4 | 35 |
| Maldives | 110 | 310 | 340 | 146 | 362 | 314 | 623 | 519 | 486 | 564 | 502 |
| Italy | 154 | 84 | 3 | 682 | 242 | 165 | 207 | 171 | 206 | 207 | 433 |
| South Africa | - | - | - | - | - | - | - | - | - | - | - |
| Faeroe Is. | 355 | 280 | 231 | 356 | 1 221 | 612 | 739 | 703 | 902 | 404 | 1 002 |
| Chile | - | - | 103 | 282 | 601 | 582 | 131 | 142 | 650 | 472 | 442 |
| Viet Nam | - | - | - | - | - | 315 | 2 180 | 3 830 | 2 690 | 1 250 | 1 068 |
| Mexico | 307 | 267 | 616 | 856 | 2 714 | 2 716 | 3 489 | 3 560 | 3 059 | 2 777 | 1 503 |
| Sweden | 54 | 120 | 978 | 685 | 548 | 239 | 305 | 166 | 104 | 137 | 370 |
| Ireland | - | - | - | 8 | - | - | - | 1 425 | 1 385 | 2 525 | 2 800 |
| Guinea-Bissau | - | - | - | - | - | - | - | - | - | - | - |
| Belgium | 106 | 69 | 88 | 226 | 175 | 85 | 137 | 62 | 103 | 101 | 149 |
| Sao Tome and Princ. | - | - | - | - | - | - | - | - | - | - | - |
| Turkey | - | - | - | - | - | - | - | - | - | 291 | 475 |
| Malaysia | 29 | 11 | 22 | 25 | 26 | 5 | 16 | 145 | 7 | 46 | 9 |
| Mauritius | - | - | - | - | - | - | - | - | - | - | - |
| Guinea | - | - | - | - | - | - | - | - | - | - | - |
| Madagascar | 21 | 12 | 13 | 14 | 32 | - | - | - | - | - | - |
| Sierra Leone | - | - | - | - | - | - | - | - | - | - | - |
| Brazil | - | - | - | - | 1 539 | 1 976 | 2 191 | 1 926 | 2 233 | 2 358 | 1 609 |
| Angola | - | - | - | - | - | - | - | - | - | - | - |
| Others | 753 | 1 863 | 2 253 | 1 768 | 2 289 | 2 790 | 3 401 | 4 898 | 4 549 | 1 884 | 2 206 |
| Total | 35 043 | 40 866 | 50 589 | 58 617 | 64 665 | 74 767 | 78 961 | 86 379 | 88 919 | 77 459 | 95 348 |

Table 12: World chondrichthyan exports by country in US\$ 1 000 (continued)

| COUNTRY | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| China | - | - | - | - | - | 13 382 | 18 362 | 19 372 | 5 506 | 27 050 | 33 243 |
| Spain | 2 224 | 486 | 105 | 563 | 1 736 | 4 337 | 9 205 | 9 236 | 12 895 | 17 840 | 27 424 |
| USA | - | - | 1 135 | 5 786 | 8 859 | 17 041 | 17 312 | 23 733 | 33 559 | 33 397 | 23 719 |
| Japan | 29 344 | 26 953 | 25 274 | 26 715 | 30 303 | 30 862 | 25 035 | 23 386 | 22 638 | 20 328 | 22 862 |
| Hong Kong | 14 702 | 22 657 | 25 584 | 24 326 | 29 938 | 6 507 | 6 398 | 5 693 | 10 180 | 18 079 | 20 021 |
| Indonesia | 2 762 | 6 422 | 11 059 | 11 289 | 12 477 | 23 538 | 19 627 | 15 432 | 16 318 | 12 083 | 10 606 |
| Taiwan PC | 1 787 | 2 061 | 4 336 | 5 030 | 6 740 | 5 138 | 3 472 | 4 581 | 10 223 | 7 308 | 7 649 |
| UK | 17 289 | 15 742 | 15 313 | 19 685 | 18 972 | 17 878 | 9 292 | 10 797 | 7 597 | 8 835 | 6 270 |
| New Zealand | 196 | 3 919 | 2 458 | 3 576 | 6 418 | 4 576 | 5 064 | 7 314 | 7 307 | 8 017 | 6 198 |
| France | 9 054 | 8 819 | 6 721 | 6 609 | 3 405 | 2 305 | 7 358 | 7 107 | 4 344 | 6 035 | 6 197 |
| Singapore | 17 497 | 18 091 | 16 090 | 15 899 | 23 000 | 34 694 | 29 144 | 42 493 | 6 875 | 4 663 | 5 673 |
| Netherlands | 376 | 461 | 770 | 508 | 723 | 428 | 2 474 | 852 | 892 | 1 054 | 5 147 |
| Canada | - | 3 141 | 1 654 | 2 914 | 2 962 | 2 400 | 3 443 | 4 413 | 5 005 | 4 147 | 4 605 |
| Denmark | 6 523 | 9 005 | 7 608 | 8 785 | 9 411 | 8 732 | 9 224 | 6 474 | 6 564 | 5 921 | 4 516 |
| Germany | 10 070 | 7 852 | 8 629 | 14 581 | 16 412 | 10 289 | 7 860 | 5 175 | 3 968 | 3 624 | 4 125 |
| Norway | 3 602 | 4 129 | 4 845 | 8 883 | 10 076 | 7 540 | 7 729 | 5 531 | 6 396 | 5 146 | 3 629 |
| Ecuador | 2 379 | 3 004 | 2 268 | 2 642 | 4 581 | 4 257 | 5 346 | 5 111 | 3 306 | 4 108 | 3 159 |
| Portugal | 43 | 1 535 | 360 | 1 722 | 1 296 | 1 839 | 2 092 | 781 | 1 057 | 1 492 | 2 788 |
| Korea Rep. | 1 087 | 2 221 | 1 408 | 1 753 | 3 048 | 2 008 | 2 306 | 1 131 | 1 363 | 894 | 2 616 |
| India | 1 518 | 2 170 | 37 | 1 076 | - | - | 1 | - | 10 | 44 | 2 610 |
| Uruguay | 435 | 238 | 162 | 155 | 216 | 367 | 93 | 349 | 556 | 1 289 | 2 396 |
| Senegal | 568 | 694 | 326 | 47 | 91 | 715 | 170 | - | 70 | 3 267 | 2 231 |
| Costa Rica | - | - | - | - | - | - | - | 1 441 | 1 182 | 1 798 | 2 085 |
| Thailand | 1 046 | 1 325 | 1 081 | 1 234 | 814 | 688 | 822 | 1 762 | 1 875 | 2 059 | 1 987 |
| Argentina | - | - | - | - | 1 764 | 1 792 | 2 106 | 2 199 | 1 934 | 1 657 | 1 101 |
| Iceland | 63 | 23 | 62 | 99 | 317 | 448 | 384 | 399 | 1 106 | 1 309 | 898 |
| Maldives | 765 | 654 | 507 | 314 | 780 | 1 136 | 806 | 584 | 827 | 637 | 840 |
| Italy | 145 | 159 | 258 | 232 | 382 | 473 | 357 | 453 | 595 | 627 | 784 |
| South Africa | - | - | - | 147 | 604 | 1 139 | 952 | 963 | 1 345 | 1 030 | 768 |
| Faeroe Is. | 1 140 | - | - | 888 | 4 250 | 2 854 | 2 036 | 401 | 556 | 761 | 724 |
| Chile | 1 158 | 2 436 | 2 666 | 2 361 | 4 807 | 1 493 | 690 | 695 | 552 | 451 | 637 |
| Viet Nam | 613 | 1 337 | 852 | 1 305 | 905 | 1 303 | - | - | 34 | 496 | 622 |
| Mexico | 2 493 | 2 056 | 2 000 | 157 | 324 | 593 | 907 | 939 | 648 | 884 | 559 |
| Sweden | 648 | 572 | 544 | 517 | 478 | 474 | 214 | 142 | 602 | 740 | 445 |
| Ireland | 4 607 | 2 893 | 1 039 | 143 | 347 | 402 | 714 | 560 | 513 | 440 | 365 |
| Guinea-Bissau | - | - | - | - | - | - | - | - | 106 | 92 | 353 |
| Belgium | 147 | 178 | 135 | 166 | 96 | 127 | 103 | 532 | 95 | 202 | 324 |
| Sao Tome and Princ. | - | - | - | - | - | - | - | - | - | - | 294 |
| Turkey | 601 | 893 | 443 | 315 | 35 | 57 | 387 | 208 | 173 | 142 | 260 |
| Malaysia | 102 | 14 | 4 | 24 | 67 | 88 | 273 | 130 | 186 | 91 | 188 |
| Mauritius | - | - | - | - | - | 16 | - | 0 | 453 | 358 | 150 |
| Guinea | - | - | - | - | - | - | - | - | - | 95 | 116 |
| Madagascar | 43 | 90 | 118 | 97 | 183 | 398 | 384 | 349 | 293 | 1 593 | 57 |
| Sierra Leone | - | - | - | - | - | - | - | - | - | - | 53 |
| Brazil | 1 944 | 2 084 | 1 851 | 1 785 | 1 828 | 3 092 | 3 183 | 2 442 | 2 713 | 2 058 | 38 |
| Angola | - | - | - | - | - | - | - | - | 4 | 9 | 31 |
| Others | 4 598 | 6 169 | 6 438 | 4 153 | 6 834 | 9 039 | 11 162 | 5 047 | 8 420 | 8 721 | 1 710 |
| Total | 141 569 | 160 483 | 154 140 | 176 481 | 215 479 | 224 445 | 216 487 | 218 207 | 190 841 | 220 871 | 223 073 |

Source: FAO - FIDL

Table 13 World chondrichthyan imports by product in tonnes

| PRODUCT | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, fresh or chilled | 6 851 | 7 201 | 7 833 | 6 419 | 5 507 | 5 650 | 5 085 | 8 280 | 10 138 | 15 959 | 15 084 |
| Skates, fresh or chilled | - | 1 | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | - | - | - | - | - | - | - |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, frozen | 13 674 | 13 242 | 15 868 | 17 740 | 14 266 | 17 551 | 19 357 | 18 970 | 18 982 | 17 879 | 16 514 |
| Skates, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, chimaeras nei, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Shark fillets, fresh or chilled | - | - | - | - | - | - | - | - | - | - | - |
| Dogfish (<i>Squalus</i> spp.) fillets, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Shark fillets, frozen | - | - | - | - | - | - | 144 | 1 279 | 963 | 610 | 487 |
| Sharks, dried, salted or in brine | - | - | - | - | - | - | - | - | - | - | - |
| Shark fins, dried, salted, etc. | 3 703 | 4 107 | 5 015 | 4 111 | 4 161 | 4 255 | 4 210 | 4 370 | 4 062 | 3 795 | 3 922 |
| Shark fins, dried, unsalted | - | 28 | 37 | 11 | - | - | - | - | - | - | - |
| Shark liver oil | - | 7 | - | 14 | 4 | 8 | 8 | 5 | - | 2 | 3 |
| TOTAL | 24 228 | 24 586 | 28 753 | 28 295 | 23 938 | 27 464 | 28 804 | 32 904 | 34 145 | 38 245 | 36 010 |

Table 13 World chondrichthyan imports by product in tonnes (continued)

| PRODUCT | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | - | - | - | - | - | - | - | - | 0 | 678 | 792 |
| Sharks, fresh or chilled | 17 864 | 17 327 | 14 482 | 16 404 | 17 148 | 15 896 | 15 601 | 16 328 | 16 220 | 15 888 | 14 366 |
| Skates, fresh or chilled | - | - | - | - | - | - | - | - | 1 | 9 | - |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | - | - | 9 | 16 | 30 | 12 | 9 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | 114 | 194 |
| Sharks, frozen | 19 669 | 20 710 | 21 804 | 26 420 | 28 093 | 27 910 | 28 019 | 28 871 | 35 240 | 36 334 | 37 767 |
| Skates, frozen | - | - | - | 81 | 239 | 1 200 | 538 | 148 | 181 | 5 785 | 8 387 |
| Sharks, rays, chimaeras nei, frozen | - | 3 982 | - | 6 300 | 6 176 | 4 708 | 8 725 | 4 450 | 2 961 | 3 085 | 3 107 |
| Shark fillets, fresh or chilled | - | 12 | - | - | - | 7 | 3 | 56 | 95 | 96 | 35 |
| Dogfish (<i>Squalus</i> spp.) fillets, frozen | - | - | - | - | - | - | - | - | - | - | 1 |
| Shark fillets, frozen | 997 | 2 277 | 2 744 | 1 819 | 1 430 | 1 634 | 842 | 1 004 | 1 143 | 706 | 981 |
| Sharks, dried, salted or in brine | 3 | - | - | - | 40 | - | - | 1 | 7 | - | - |
| Shark fins, dried, salted, etc. | 4 906 | 5 909 | 5 224 | 5 260 | 5 791 | 5 738 | 5 437 | 5 726 | 1 775 | 6 993 | 6 916 |
| Shark fins, dried, unsalted | 1 | 6 | 12 | 12 | 2 | 5 | 2 | 4 | 5 | 18 | 109 |
| Shark liver oil | 45 | 181 | 303 | 544 | 821 | 402 | 397 | 749 | 448 | 286 | 192 |
| TOTAL | 43 485 | 50 404 | 44 569 | 56 840 | 59 740 | 57 500 | 59 573 | 57 353 | 58 106 | 70 005 | 73 055 |

Source: FAO - FIDI.

Table 14 World chondrichthyan imports by product in US\$ 1 000

| PRODUCT | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, fresh or chilled | 9 363 | 10 392 | 13 046 | 13 768 | 14 508 | 12 763 | 10 417 | 13 161 | 13 745 | 18 840 | 26 937 |
| Skates, fresh or chilled | - | 0 | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | - | - | - | - | - | - | - |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, frozen | 18 159 | 16 486 | 23 887 | 30 490 | 27 332 | 35 533 | 41 768 | 39 950 | 40 109 | 30 014 | 34 965 |
| Skates, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, chimaeras nei, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Shark fillets, fresh or chilled | - | - | - | - | - | - | - | - | - | - | - |
| Dogfish (<i>Squalus</i> spp.) fillets, frozen | - | - | - | - | - | - | 399 | 4 240 | 3 204 | 1 300 | 1 182 |
| Shark fillets, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, dried, salted or in brine | - | - | - | - | - | - | - | - | - | - | - |
| Shark fins, dried, salted, etc. | 20 046 | 31 264 | 44 178 | 38 426 | 41 257 | 47 956 | 56 566 | 54 167 | 54 314 | 50 190 | 57 012 |
| Shark fins, dried, unsalted | - | 150 | 245 | 50 | - | - | - | - | - | 9 | - |
| Shark liver oil | - | 5 | - | 47 | 46 | 62 | 40 | 24 | - | 9 | 19 |
| Total | 47 568 | 58 297 | 81 356 | 82 781 | 83 143 | 96 314 | 109 190 | 111 542 | 111 372 | 100 362 | 120 115 |

Table 14 World chondrichthyan imports by product in US\$ 1 000 (continued)

| PRODUCT | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | - | - | - | - | - | - | - | - | 0 | 980 | 1 297 |
| Sharks, fresh or chilled | 34 061 | 39 276 | 33 048 | 43 333 | 46 500 | 42 062 | 42 695 | 45 390 | 44 554 | 45 479 | 42 167 |
| Skates, fresh or chilled | - | - | - | - | - | 1 | 1 | 1 | 2 | 12 | - |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | - | - | 1 | 81 | 215 | 40 | 25 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | 152 | 426 |
| Sharks, frozen | 53 279 | 50 449 | 54 633 | 78 538 | 90 361 | 86 555 | 76 088 | 79 689 | 102 851 | 94 954 | 91 436 |
| Skates, frozen | - | - | - | 212 | 356 | 452 | 742 | 172 | 303 | 13 993 | 17 660 |
| Sharks, rays, chimaeras nei, frozen | - | 3 472 | - | 5 565 | 7 812 | 6 153 | 9 367 | 4 395 | 2 924 | 3 622 | 3 519 |
| Shark filets, fresh or chilled | - | 75 | - | - | - | 20 | 15 | 274 | 453 | 517 | 161 |
| Dogfish (<i>Squalus</i> spp.) filets, frozen | - | - | - | - | - | - | - | - | - | 4 | - |
| Shark filets, frozen | 3 689 | 7 745 | 9 720 | 8 603 | 7 873 | 9 002 | 3 826 | 2 877 | 4 141 | 2 948 | 4 200 |
| Sharks, dried, salted or in brine | 1 | - | - | - | 41 | - | 12 | 5 | 45 | - | - |
| Shark fins, dried, salted, etc. | 90 955 | 121 498 | 120 830 | 120 301 | 153 889 | 74 504 | 69 741 | 66 344 | 21 404 | 52 313 | 54 245 |
| Shark fins, dried, unsalted | 86 | 430 | 383 | 299 | 67 | 232 | 289 | 419 | 218 | 945 | 1 296 |
| Shark liver oil | 79 | 1 021 | 2 049 | 4 483 | 9 277 | 4 579 | 4 766 | 4 706 | 1 704 | 1 325 | 726 |
| Total | 182 150 | 223 966 | 220 663 | 261 334 | 316 176 | 223 560 | 207 543 | 204 353 | 178 814 | 217 284 | 217 158 |

Source: FAO - FIDI.

Table 15 World chondrichthyan imports by product: unit value, US\$/kg

| PRODUCT | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, fresh or chilled | 1.37 | 1.44 | 1.67 | 2.14 | 2.63 | 2.26 | 2.05 | 1.59 | 1.36 | 1.18 | 1.79 |
| Skates, fresh or chilled | - | 0.00 | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | - | - | - | - | - | - | - |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, frozen | 1.33 | 1.24 | 1.51 | 1.72 | 1.92 | 2.02 | 2.16 | 2.11 | 2.11 | 1.68 | 2.12 |
| Skates, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, chimaeras nei, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Shark fillets, fresh or chilled | - | - | - | - | - | - | - | - | - | - | - |
| Dogfish (<i>Squalus</i> spp.) fillets, frozen | - | - | - | - | - | - | - | - | - | - | - |
| Shark fillets, frozen | - | - | - | - | - | - | 2.77 | 3.32 | 3.33 | 2.13 | 2.43 |
| Sharks, dried, salted or in brine | - | - | - | - | - | - | - | - | - | - | - |
| Shark fins, dried, salted, etc. | 5.41 | 7.61 | 8.81 | 9.35 | 9.92 | 11.27 | 13.44 | 12.40 | 13.37 | 13.23 | 14.54 |
| Shark fins, dried, unsalted | - | 5.36 | 6.62 | 4.55 | - | - | - | - | - | - | - |
| Shark liver oil | - | 0.71 | - | 3.36 | 11.50 | 7.75 | 5.00 | 4.80 | - | 4.50 | 6.33 |

Table 15 World chondrichthyan imports by product: unit value, US\$/kg (continued)

| PRODUCT | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|-------|
| Dogfish (<i>Squalus</i> spp.), fresh or chilled | - | - | - | - | - | - | - | - | - | 1.45 | 1.64 |
| Sharks, fresh or chilled | 1.91 | 2.27 | 2.28 | 2.64 | 2.71 | 2.65 | 2.74 | 2.78 | 2.75 | 2.86 | 2.94 |
| Skates, fresh or chilled | - | - | - | - | - | - | - | - | 2.00 | 1.33 | - |
| Sharks, rays, skates, fresh or chilled, nei | - | - | - | - | - | - | 0.11 | 5.06 | 7.17 | 3.33 | 2.78 |
| Dogfish (<i>Squalus</i> spp.), frozen | - | - | - | - | - | - | - | - | - | 1.33 | 2.20 |
| Sharks, frozen | 2.71 | 2.44 | 2.51 | 2.97 | 3.22 | 3.10 | 2.72 | 2.76 | 2.92 | 2.61 | 2.42 |
| Skates, frozen | - | - | - | 2.62 | 1.49 | 0.38 | 1.38 | 1.16 | 1.67 | 2.42 | 2.06 |
| Sharks, rays, chimaeras nei, frozen | - | 0.87 | - | 0.88 | 1.26 | 1.31 | 1.07 | 0.99 | 0.99 | 1.17 | 1.13 |
| Shark filets, fresh or chilled | - | 6.25 | - | - | - | 2.86 | 5.00 | 4.89 | 4.77 | 5.39 | 4.60 |
| Dogfish (<i>Squalus</i> spp.) filets, frozen | - | - | - | - | - | - | - | - | - | 4.00 | - |
| Shark filets, frozen | 3.70 | 3.40 | 3.54 | 4.73 | 5.51 | 5.51 | 4.54 | 2.87 | 3.62 | 4.18 | 4.28 |
| Sharks, dried, salted or in brine | 0.33 | - | - | - | 1.03 | - | - | 5.00 | 6.43 | - | - |
| Shark fins, dried, salted, etc. | 18.54 | 20.56 | 23.13 | 22.87 | 26.57 | 12.98 | 12.83 | 11.59 | 12.06 | 7.48 | 7.84 |
| Shark fins, dried, unsalted | 86.00 | 71.67 | 31.92 | 24.92 | 33.50 | 46.40 | 144.50 | 104.75 | 43.60 | 52.50 | 11.89 |
| Shark liver oil | 1.76 | 5.64 | 6.76 | 8.24 | 11.30 | 11.39 | 12.01 | 6.28 | 3.80 | 4.63 | 3.78 |

Source: FAO - FIDI.

Table 16 World chondrichthyan imports by country in tonnes

| COUNTRY | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|-----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Italy | 8 750 | 6 249 | 7 412 | 8 110 | 4 903 | 5 604 | 8 061 | 7 937 | 8 710 | 8 847 | 6 925 |
| Korea Rep. | - | 35 | 37 | 25 | 4 | 8 | 8 | 5 | - | 2 | 3 |
| France | 4 703 | 5 453 | 5 665 | 5 490 | 4 620 | 5 523 | 5 212 | 7 008 | 7 730 | 8 883 | 8 996 |
| Spain | - | - | - | - | - | 852 | 787 | 601 | 509 | 1 293 | 1 565 |
| China | - | - | - | - | - | - | - | - | - | - | - |
| UK | 1 112 | 1 164 | 1 437 | 2 014 | 1 669 | 1 462 | 1 542 | 3 298 | 3 379 | 6 362 | 5 074 |
| USA | - | - | - | - | - | - | - | - | - | - | - |
| Hong Kong | 2 249 | 2 484 | 3 334 | 2 644 | 2 742 | 2 752 | 2 746 | 2 552 | 2 779 | 2 648 | 2 879 |
| Germany | 3 298 | 3 231 | 4 167 | 3 907 | 4 585 | 5 610 | 5 334 | 5 283 | 5 673 | 3 775 | 3 704 |
| Netherlands | - | 345 | 620 | 369 | 121 | 311 | 150 | 136 | 236 | 205 | 281 |
| Japan | 713 | 1 766 | 1 491 | 1 484 | 1 303 | 1 354 | 1 206 | 1 411 | 1 082 | 1 764 | 1 972 |
| Denmark | 841 | 1 246 | 1 974 | 1 783 | 1 503 | 1 349 | 1 258 | 1 348 | 1 364 | 1 586 | 1 603 |
| Singapore | 917 | 1 078 | 1 252 | 939 | 822 | 810 | 843 | 1 050 | 895 | 887 | 840 |
| Uruguay | - | - | - | - | - | - | - | - | - | - | - |
| Greece | - | - | - | - | - | 92 | 114 | 360 | 293 | 568 | 1 046 |
| Canada | - | - | - | - | - | - | - | - | - | - | - |
| Belgium | 937 | 965 | 912 | 980 | 1 069 | 1 044 | 915 | 1 062 | 1 039 | 1 105 | 885 |
| Portugal | - | - | - | - | - | - | - | - | - | - | - |
| Madagascar | - | - | - | - | - | - | - | - | - | - | - |
| Taiwan PC | - | - | - | - | - | - | - | - | - | 1 | 2 |
| Thailand | 314 | 302 | 91 | 119 | 109 | 163 | 173 | 147 | 84 | 97 | 95 |
| Brazil | - | - | - | - | - | - | - | - | - | - | - |
| Algeria | - | - | - | - | - | - | - | - | - | - | - |
| Mexico | - | - | - | - | - | - | - | - | - | - | - |
| Venezuela | - | - | - | - | - | - | - | - | - | - | - |
| Guatemala | - | - | - | - | - | - | - | - | - | - | - |
| El Salvador | - | - | - | - | - | - | - | - | - | - | - |
| Norway | 160 | 24 | 21 | 22 | - | - | 3 | 80 | 63 | 29 | 15 |
| Malaysia | 219 | 225 | 325 | 394 | 472 | 512 | 432 | 602 | 274 | 138 | 74 |
| Sweden | 11 | 1 | 2 | - | - | - | 4 | 5 | 5 | 11 | 19 |
| Indonesia | - | - | - | - | 0 | - | - | - | - | - | - |
| Czech Republic | - | - | - | - | - | - | - | - | - | - | - |
| Colombia | - | - | - | - | - | - | - | - | - | - | - |
| New Zealand | - | - | - | - | - | - | - | - | - | - | - |
| Mauritius | - | - | - | - | - | - | - | - | - | - | - |
| United Arab Emirates | - | - | - | - | - | - | - | - | - | - | - |
| Austria | - | - | - | - | - | - | - | - | - | - | - |
| Poland | - | - | - | - | - | - | - | - | - | - | - |
| Switzerland | - | - | - | - | - | - | - | - | - | - | - |
| South Africa | - | - | - | - | - | - | - | - | - | - | - |
| Sri Lanka | 0 | - | - | - | - | - | - | - | - | - | - |
| Saint Kitts and Nevis | - | - | - | - | - | - | - | - | - | - | - |
| Brunei Darussalam | 4 | 18 | 13 | 15 | 16 | 15 | 14 | 16 | 27 | 16 | 22 |
| Australia | - | - | - | - | - | 3 | 1 | 3 | 3 | 5 | 10 |
| Macau | - | - | - | - | - | - | - | - | - | - | - |
| Fiji Islands | - | - | - | - | - | - | - | - | - | - | - |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 23 | 0 |
| Total | 24 228 | 24 586 | 28 753 | 28 295 | 23 938 | 27 464 | 28 804 | 32 904 | 34 145 | 38 245 | 36 010 |

Table 16 World chondrichthyan imports by country in tonnes (continued)

| COUNTRY | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|-----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Italy | 8 615 | 9 405 | 10 470 | 12 324 | 12 999 | 12 023 | 11 923 | 11 987 | 12 705 | 14 994 | 14 398 |
| Korea Rep. | 46 | 4 786 | 481 | 6 878 | 7 169 | 5 388 | 9 522 | 5 842 | 4 788 | 10 849 | 14 390 |
| France | 9 778 | 10 124 | 8 404 | 8 786 | 8 733 | 9 370 | 8 002 | 7 629 | 7 315 | 8 210 | 7 322 |
| Spain | 2 153 | 3 451 | 2 001 | 2 308 | 3 409 | 4 788 | 4 900 | 4 669 | 5 340 | 6 372 | 7 218 |
| China | - | - | - | - | - | 3 195 | 3 621 | 3 922 | 772 | 4 848 | 4 966 |
| UK | 7 386 | 4 542 | 2 624 | 3 105 | 2 305 | 2 568 | 2 693 | 3 094 | 3 276 | 3 113 | 2 823 |
| USA | - | - | 2 706 | 2 945 | 2 828 | 2 540 | 2 138 | 3 008 | 3 262 | 3 426 | 2 721 |
| Hong Kong | 3 553 | 3 738 | 3 554 | 3 838 | 4 272 | 844 | 543 | 471 | 1 191 | 1 858 | 2 241 |
| Germany | 4 357 | 2 843 | 3 523 | 4 156 | 4 019 | 3 093 | 3 630 | 2 894 | 2 408 | 2 095 | 2 210 |
| Netherlands | 242 | 233 | 201 | 124 | 123 | 199 | 1 421 | 1 869 | 4 174 | 2 107 | 1 956 |
| Japan | 1 907 | 2 403 | 1 799 | 2 166 | 3 047 | 2 630 | 2 046 | 2 008 | 2 106 | 2 451 | 1 810 |
| Denmark | 2 081 | 3 018 | 3 835 | 4 142 | 4 785 | 3 532 | 3 074 | 2 517 | 2 438 | 1 911 | 1 491 |
| Singapore | 1 154 | 1 878 | 1 173 | 1 006 | 931 | 1 027 | 1 093 | 1 190 | 1 486 | 1 020 | 1 378 |
| Uruguay | - | - | - | - | - | - | 11 | 2 | - | 137 | 1 303 |
| Greece | 941 | 1 458 | 1 343 | 1 749 | 1 332 | 1 094 | 535 | 356 | 915 | 1 459 | 1 100 |
| Canada | - | 432 | 381 | 492 | 476 | 551 | 737 | 860 | 1 099 | 1 029 | 686 |
| Belgium | 1 003 | 906 | 743 | 1 015 | 1 107 | 1 117 | 1 066 | 1 120 | 844 | 743 | 662 |
| Portugal | 34 | 34 | 15 | 110 | 99 | 128 | 23 | 189 | 248 | 427 | 652 |
| Madagascar | - | - | - | - | - | - | - | - | - | - | 575 |
| Taiwan PC | 16 | 79 | 96 | 40 | 31 | 102 | 65 | 126 | 391 | 200 | 411 |
| Thailand | 106 | 605 | 745 | 699 | 699 | 591 | 562 | 763 | 527 | 553 | 360 |
| Brazil | - | - | - | 6 | 73 | 2 | 4 | 159 | 371 | 213 | 277 |
| Algeria | - | - | - | - | - | - | - | - | - | 13 | 263 |
| Mexico | - | - | - | 249 | 147 | 636 | 731 | 1 103 | 207 | 180 | 222 |
| Venezuela | - | - | - | - | - | - | - | - | 33 | 4 | 208 |
| Guatemala | - | - | - | - | - | - | 12 | 5 | - | - | 202 |
| El Salvador | - | - | - | - | - | - | - | 8 | - | 43 | 183 |
| Norway | 6 | 162 | 230 | 324 | 322 | 114 | 36 | 364 | 322 | 170 | 170 |
| Malaysia | 68 | 76 | 102 | 108 | 134 | 248 | 189 | 279 | 159 | 416 | 150 |
| Sweden | 22 | 20 | 18 | 24 | 18 | 22 | 40 | 45 | 354 | 294 | 108 |
| Indonesia | 0 | 0 | 4 | 1 | - | - | 3 | 2 | 6 | 14 | 98 |
| Czech Republic | - | - | - | - | - | - | - | - | 68 | 26 | 95 |
| Colombia | - | - | - | - | - | - | - | - | - | - | 55 |
| New Zealand | - | - | - | 81 | 242 | 1 233 | 538 | 315 | 283 | 154 | 51 |
| Mauritius | - | - | - | - | - | - | - | - | 164 | 109 | 49 |
| United Arab Emirates | - | - | - | - | - | - | - | - | 181 | - | 47 |
| Austria | - | 28 | 28 | 32 | 35 | 17 | 18 | 20 | 29 | 36 | 46 |
| Poland | - | - | - | - | - | - | - | - | 2 | 24 | 36 |
| Switzerland | - | 117 | 30 | 51 | 53 | 39 | 35 | 21 | 31 | 29 | 18 |
| South Africa | - | - | - | - | 31 | 79 | 37 | 56 | 16 | 6 | 18 |
| Sri Lanka | - | - | - | - | - | - | - | - | - | 9 | 10 |
| Saint Kitts and Nevis | - | - | - | - | - | - | - | - | - | - | 9 |
| Brunei Darussalam | 1 | 22 | 4 | 16 | 4 | 5 | - | - | - | 1 | 2 |
| Australia | 6 | 36 | 21 | 22 | 5 | 8 | 54 | 48 | 167 | 140 | - |
| Macau | - | - | - | - | 134 | 168 | 154 | 120 | 132 | 125 | - |
| Fiji Islands | - | - | 12 | 19 | 97 | 44 | 29 | 25 | 34 | 23 | - |
| Others | 10 | 8 | 26 | 24 | 81 | 105 | 88 | 267 | 262 | 173 | 59 |
| Total | 43 485 | 50 404 | 44 569 | 56 840 | 59 740 | 57 500 | 59 573 | 57 353 | 58 106 | 70 005 | 73 055 |

Source: FAO - FIDI.

Table 17 World chondrichthyan imports by country in US\$ 1 000

| COUNTRY | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|-----------------------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|
| Italy | 13 123 | 8 772 | 12 752 | 15 713 | 12 850 | 16 748 | 22 330 | 23 571 | 24 516 | 20 841 | 23 191 |
| Korea Rep. | - | 155 | 245 | 97 | 46 | 62 | 40 | 24 | - | 18 | 19 |
| China | - | - | - | - | - | - | - | - | - | - | - |
| Hong Kong | 13 844 | 21 593 | 33 471 | 27 277 | 30 622 | 34 992 | 40 490 | 37 441 | 38 932 | 36 649 | 44 486 |
| Japan | 597 | 1 452 | 1 193 | 1 370 | 1 420 | 1 300 | 1 302 | 1 383 | 1 201 | 1 767 | 2 269 |
| France | 5 979 | 7 157 | 9 208 | 10 742 | 9 095 | 9 221 | 8 496 | 10 953 | 10 101 | 10 096 | 15 299 |
| Spain | - | - | - | - | - | 1 014 | 893 | 438 | 389 | 1 401 | 1 959 |
| USA | - | - | - | - | - | - | - | - | - | - | - |
| Netherlands | - | 442 | 938 | 596 | 288 | 602 | 244 | 173 | 460 | 294 | 552 |
| UK | 941 | 1 107 | 1 365 | 2 765 | 2 278 | 1 706 | 2 027 | 3 852 | 2 715 | 3 697 | 3 396 |
| Germany | 4 667 | 5 103 | 7 196 | 8 193 | 11 021 | 13 201 | 13 531 | 12 822 | 13 659 | 7 666 | 10 391 |
| Singapore | 4 300 | 6 997 | 8 649 | 8 588 | 8 190 | 9 454 | 12 128 | 13 131 | 12 728 | 10 919 | 9 786 |
| Denmark | 863 | 1 458 | 2 748 | 3 029 | 3 021 | 2 506 | 2 051 | 1 858 | 1 928 | 2 136 | 2 615 |
| Taiwan PC | - | - | - | - | - | - | - | - | - | 10 | 15 |
| Belgium | 1 221 | 1 354 | 1 501 | 1 823 | 1 867 | 1 783 | 1 485 | 1 661 | 1 496 | 1 330 | 1 652 |
| Greece | - | - | - | - | - | 214 | 218 | 543 | 511 | 862 | 1 670 |
| Uruguay | - | - | - | - | - | - | - | - | - | - | - |
| Canada | - | - | - | - | - | - | - | - | - | - | - |
| Portugal | - | - | - | - | - | - | - | - | - | - | - |
| Thailand | 1 178 | 1 759 | 1 084 | 1 375 | 1 297 | 1 785 | 2 160 | 1 845 | 1 071 | 1 614 | 2 020 |
| Malaysia | 689 | 859 | 883 | 1 086 | 1 046 | 1 523 | 1 604 | 1 526 | 1 323 | 731 | 309 |
| Indonesia | - | - | - | - | 0 | - | - | - | - | - | - |
| Madagascar | - | - | - | - | - | - | - | - | - | - | - |
| United Arab Emirates | - | - | - | - | - | - | - | - | - | - | - |
| Norway | 123 | 32 | 29 | 27 | - | 1 | 2 | 91 | 74 | 30 | 33 |
| Sweden | 8 | 1 | 3 | - | - | - | 5 | 6 | 8 | 22 | 56 |
| Brazil | - | - | - | - | - | - | - | - | - | - | - |
| Algeria | - | - | - | - | - | - | - | - | - | - | - |
| Austria | - | - | - | - | - | - | - | - | - | - | - |
| Brunei Darussalam | 35 | 55 | 91 | 100 | 102 | 111 | 123 | 129 | 132 | 95 | 148 |
| Venezuela | - | - | - | - | - | - | - | - | - | - | - |
| Mexico | - | - | - | - | - | - | - | - | - | - | - |
| Mauritius | - | - | - | - | - | - | - | - | - | - | - |
| Czech Republic | - | - | - | - | - | - | - | - | - | - | - |
| Poland | - | - | - | - | - | - | - | - | - | - | - |
| New Zealand | - | - | - | - | - | - | - | - | - | - | - |
| El Salvador | - | - | - | - | - | - | - | - | - | - | - |
| Switzerland | - | - | - | - | - | - | - | - | - | - | - |
| Saint Kitts and Nevis | - | - | - | - | - | - | - | - | - | - | - |
| Colombia | - | - | - | - | - | - | - | - | - | - | - |
| Guatemala | - | - | - | - | - | - | - | - | - | - | - |
| South Africa | - | - | - | - | - | - | - | - | - | - | - |
| Sri Lanka | 0 | - | - | - | - | - | - | - | - | - | - |
| Macau | - | - | - | - | - | - | - | - | - | - | - |
| Australia | - | - | - | - | - | 91 | 60 | 92 | 125 | 168 | 248 |
| Fiji Islands | - | - | - | - | - | - | - | - | - | - | - |
| Others | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 16 | 1 |
| Total | 47 568 | 58 297 | 81 356 | 82 781 | 83 143 | 96 314 | 109 190 | 111 542 | 111 372 | 100 362 | 120 115 |

Table 17 World chondrichthyan imports by country in US\$ 1 000 (continued)

| COUNTRY | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Italy | 32 439 | 35 880 | 36 162 | 51 548 | 61 122 | 51 805 | 40 846 | 42 548 | 40 851 | 42 469 | 39 906 |
| Korea Rep. | 165 | 5 043 | 2 284 | 9 956 | 17 413 | 12 181 | 14 857 | 9 939 | 6 639 | 21 454 | 26 967 |
| China | - | - | - | - | - | 18 775 | 21 871 | 23 324 | 7 301 | 27 862 | 26 506 |
| Hong Kong | 71 710 | 96 777 | 93 308 | 94 981 | 119 791 | 9 483 | 6 228 | 4 798 | 12 988 | 19 341 | 23 617 |
| Japan | 3 023 | 4 488 | 4 884 | 6 234 | 9 584 | 11 161 | 11 437 | 9 837 | 17 191 | 18 903 | 17 889 |
| France | 20 498 | 22 188 | 20 468 | 24 176 | 22 479 | 23 310 | 20 202 | 19 556 | 18 961 | 20 104 | 17 631 |
| Spain | 3 356 | 6 861 | 3 531 | 5 073 | 7 321 | 10 115 | 7 991 | 9 736 | 11 097 | 11 865 | 11 403 |
| USA | - | - | 8 057 | 8 533 | 10 034 | 12 848 | 12 853 | 10 436 | 8 334 | 7 936 | 8 357 |
| Netherlands | 703 | 621 | 470 | 518 | 511 | 651 | 4 375 | 6 090 | 11 693 | 8 774 | 8 062 |
| UK | 6 682 | 4 501 | 3 836 | 5 448 | 4 340 | 4 318 | 4 235 | 5 644 | 6 514 | 6 771 | 6 391 |
| Germany | 16 400 | 9 528 | 10 976 | 15 990 | 16 539 | 12 071 | 10 777 | 8 943 | 6 986 | 6 440 | 6 167 |
| Singapore | 16 177 | 20 255 | 19 556 | 18 416 | 25 857 | 35 112 | 31 966 | 32 937 | 4 895 | 2 791 | 4 726 |
| Denmark | 3 546 | 5 083 | 5 760 | 6 257 | 7 394 | 6 904 | 5 747 | 4 342 | 4 081 | 3 514 | 2 609 |
| Taiwan PC | 238 | 1 318 | 1 762 | 869 | 587 | 1 725 | 1 860 | 1 463 | 1 075 | 906 | 2 007 |
| Belgium | 2 545 | 2 744 | 1 971 | 2 579 | 2 942 | 2 679 | 2 302 | 2 674 | 2 238 | 1 985 | 1 859 |
| Greece | 1 661 | 3 008 | 2 696 | 4 380 | 3 326 | 2 610 | 1 069 | 696 | 1 760 | 2 707 | 1 805 |
| Uruguay | - | - | - | - | - | - | 3 | 2 | - | 90 | 1 488 |
| Canada | - | 513 | 603 | 758 | 791 | 946 | 1 066 | 1 874 | 2 246 | 2 135 | 1 404 |
| Portugal | 44 | 79 | 16 | 260 | 163 | 354 | 41 | 311 | 533 | 826 | 1 129 |
| Thailand | 2 235 | 2 769 | 1 964 | 1 596 | 1 105 | 1 346 | 1 981 | 2 383 | 2 440 | 2 272 | 1 024 |
| Malaysia | 328 | 357 | 534 | 475 | 531 | 831 | 980 | 945 | 928 | 861 | 944 |
| Indonesia | 0 | 0 | 17 | 6 | 1 | 5 | 67 | 141 | 59 | 183 | 631 |
| Madagascar | - | - | - | - | - | - | - | - | - | - | 616 |
| United Arab Emirates | - | - | - | - | - | - | - | - | 1 536 | - | 543 |
| Norway | 34 | 390 | 736 | 1 374 | 1 286 | 450 | 213 | 126 | 493 | 367 | 474 |
| Sweden | 86 | 69 | 89 | 132 | 98 | 113 | 141 | 133 | 644 | 645 | 361 |
| Brazil | - | - | - | 1 | 55 | 1 | 25 | 136 | 410 | 263 | 352 |
| Algeria | - | - | - | - | - | - | - | - | - | 9 | 321 |
| Austria | - | 137 | 122 | 166 | 182 | 89 | 86 | 108 | 234 | 258 | 220 |
| Brunei Darussalam | 15 | 460 | 80 | 90 | 50 | 50 | - | - | - | 116 | 218 |
| Venezuela | - | - | - | - | - | - | - | - | 8 | 2 | 209 |
| Mexico | - | - | - | 282 | 125 | 371 | 482 | 989 | 224 | 182 | 207 |
| Mauritius | - | - | - | - | - | - | - | - | 643 | 439 | 192 |
| Czech Republic | - | - | - | - | - | - | - | - | 135 | 49 | 183 |
| Poland | - | - | - | - | - | - | - | - | 14 | 44 | 127 |
| New Zealand | - | - | - | 213 | 428 | 532 | 746 | 657 | 526 | 341 | 105 |
| El Salvador | - | - | - | - | - | - | - | 3 | - | 23 | 104 |
| Switzerland | - | 594 | 145 | 192 | 319 | 278 | 131 | 83 | 203 | 178 | 82 |
| Saint Kitts and Nevis | - | - | - | - | - | - | - | - | - | - | 72 |
| Colombia | - | - | - | - | - | - | - | - | - | - | 44 |
| Guatemala | - | - | - | - | - | - | 3 | 8 | - | - | 37 |
| South Africa | - | - | - | - | 29 | 397 | 76 | 126 | 25 | 7 | 21 |
| Sri Lanka | - | - | - | - | - | - | - | - | - | 3 | 3 |
| Macau | - | - | - | - | 602 | 969 | 1 261 | 1 164 | 1 357 | 1 739 | - |
| Australia | 251 | 281 | 515 | 405 | 397 | 479 | 902 | 970 | 1 776 | 1 580 | - |
| Fiji Islands | - | - | 50 | 366 | 622 | 429 | 553 | 856 | 1 052 | 566 | - |
| Others | 14 | 22 | 71 | 60 | 152 | 172 | 170 | 375 | 724 | 284 | 145 |
| Total | 182 150 | 223 966 | 220 663 | 261 334 | 316 176 | 223 560 | 207 543 | 204 353 | 178 814 | 217 284 | 217 158 |

Source: FAO - FIDI.

6. PRODUCTS

The following sections analyse the major shark products according to their use, markets, species, and trade.

6.1 MEAT

Sharks have traditionally been used as food in coastal areas since the earliest times. Consumption of shark meat has been recorded in literature as early as the fourth century. The Cretans and Persians caught and sold sharks some 5 000 years ago in the Persian Gulf and the Mediterranean. Until the beginning of the twentieth century shark meat consumption was rather limited and was unfavourably regarded as food in many countries. Shark meat was difficult to handle without ice or refrigeration and it so often had a strong smell and taste due to improper handling (see section on processing and preparation) that was not acceptable to consumers not accustomed to it. Shark meat was more familiar to inhabitants of fishing villages and nearby settlements in the coastal areas of Asia, Africa, Latin America and the Pacific islands. It was also eaten by the Inuit and in Europe and Japan. The meat was consumed and preserved in these different countries according to their food traditions and the technologies available to them at that time. Apart from consuming the fish fresh, the most common preservation methods were drying, salting or smoking.

The commercial exploitation of sharks started after the First World War. In that period the belly flaps of pickled dogfish were smoked in Germany and shark meat was introduced in the fish and chips trade (a traditional British take-away dish of deep-fried fish fillets and potato) in the UK. In the USA there was research into the tanning of shark hides and, in 1925, the Ocean Leather Corporation, a society that has monopolized the world production of shark leather for decades, was founded. Mexican and Venezuelan fishermen started to fish sharks on a commercial scale to supply hides to the US market and they also began to sell salted and/or dried shark meat in local markets. During the 1940s there was a remarkable increase in shark exploitation and in their commercial value in some areas of the world such as the USA and Europe, when the high Vitamin A content of shark liver oil was discovered. This market disappeared when synthetic Vitamin A was developed. During the liver oil boom, meat and other parts of the animal were usually discarded. This waste of raw material of 75-83% of the shark catch did not pass unnoticed by some businessmen and fisheries authorities but it was only with the development of refrigeration that the acceptance of shark meat occurred. Since the late 1950s there has been a greater use and a favourable recognition of shark meat as food. This acceptance was due to various factors such as better handling of shark meat with the use of ice and freezing, the awareness of widespread malnutrition, the need to utilize fully all available resources of animal protein for human nutrition, the contemporaneous shortage of highly preferred bony fish in some areas and marketing efforts to promote shark meat as a substitute or alternative. This increase in consumption has not been equally strong and has not followed the same pattern in all countries, with considerable differences in utilization during the last four decades. In many countries industry and/or government undertook marketing campaigns, promotional activities and market development efforts to promote shark meat and to get over consumer prejudices and reluctance to accept shark meat, which was considered unpalatable and

a poor man's food. These promotional efforts took many forms. In some countries, such as the UK, Germany and Australia, industry, without any government assistance, used shark meat and developed products or used the meat in already existing products. In other countries, as for example Japan, Canada, the USA and the former USSR, the government supported industry in one way or another, and product development, or at least product testing, was accomplished in government laboratories. Other nations such as Mexico, Mozambique, Trinidad and Tobago, Surinam, Panama and Honduras, were assisted by national or international organizations, eg. FAO. This assistance was mainly of technical nature: improving fishing and processing technologies, marketing, and distribution²⁸.

6.1.1 Market names

In many countries it has been necessary to camouflage the name shark under a number of euphemisms to overcome consumer resistance.

In the UK, picked dogfish was introduced and marketed as "flake" or "huss". Nowadays, even if these two terms are still used, it is more often marketed as "rock salmon". The term "rigg" is also used.

In France, picked dogfish, smooth-hound and tope sharks are commercialised as *chiens*. The skinless meat of these species is marketed as *saumonette*, as is sometimes the meat of small-spotted catshark and nursehound but these are usually marketed as *petite roussette* and *grande roussette* respectively, to highlight their colour. Porbeagle shark is commercialized as *taupe* or *veau de mer*.

In Germany, picked dogfish backs (whole, skinless, headed and gutted, bellies removed) are sold as *seeaal* (sea eel) and smoked belly flaps (skinned and trimmed) as *Schillerlocken* (curls of Schiller). Other shark species are sold under trade names followed by the German vernacular name of the shark species. For example, the porbeagle, *Heringshai* in German, appears as *Kalbfisch*; the smooth-hound, *Grauhai* in German, as *Speckfisch*. The Greenland shark (*Somniosus microcephalus*), *Eishai* in German, is also traded as *Speckfisch*²⁹.

In Italy sharks are usually marketed as *palombo* (smooth-hounds), *smoriglio* (porbeagle and mako sharks), *gattucci* (catsharks), *spinaroli* (picked dogfish) and *cani spellati*. In Venice, *palombo* steaks are known as *vitello di mare* (veal of the sea). There are also reports that blue sharks are deliberately marketed as the more valuable smooth-hounds under the name *palombo*, and porbeagle and mako sharks as *pesce spada* (swordfish).

In the USA, shark was commercialized as "steakfish", "grayfish" (usually picked dogfish) and "whitefish" from the 1940s until the government issued rules to prevent mislabelling. Now sharks are sold under their real names. More recently picked dogfish has also been marketed as "cape shark".

²⁸ KREUZER R., AHMED R., "Shark utilization and marketing" FAO, Rome, 1978.

²⁹ LUDORFF W., "Fische und Fischerzeugnisse", 2., völlig neubearb. und erw. Aufl. Von V. Meyer, Berlin, Parey, (Grundlagen und Fortschritte der Lebensmitteluntersuchung, Bd.6), 1973

In 1970 Canada began to promote Pacific dogfish (*Squalus suckleyi*) for domestic consumption. After successful testing and tasting of the product in government laboratories, the Government recognized the market name *Kahada*, the Haida Indian name for dogfish, for deep fried fillets of this species. Although the need for a trade name was considered a necessary step for its introduction, marketing efforts have not been very successful¹⁰.

In Australia, picked dogfish and other species are marketed as "flake". This term was first used to introduce gummy shark (*Mustelus antarcticus*). It sold well at a good profit and established itself as a fish of prime eating quality, so much so that the demand remained when consumers discovered that what they were eating was in fact gummy shark.

In Argentina, angelshark is commercialized as *gallina del mar* (chicken of the sea), and smooth-hounds as *palo rosado* (pink stick).

In Trinidad and Tobago hot smoked shark fillets are marketed as "sea-ham".

Not all countries needed to disguise the shark true identity in the market place, and in any case with the increased consumption of shark meat in the last few years, it is more and more simply sold as shark.

6.1.2 Preferred species

It is particularly difficult to identify shark species preferred for their meat on a worldwide basis. There is a great variety of favourite species according to regional differences in species availability, processing and preparation techniques and consumption patterns. Yet, there are a few species whose meat is widely considered of higher quality than others, such as shortfin mako shark, thresher shark and porbeagles. Shortfin mako shark is to a wide extent recognized as the world's best quality shark. It is particularly appreciated fresh in the USA and Europe where it is sold at prices in line with those of swordfish. It is used to prepare a high quality sashimi in Asia, especially in Japan. The quality of the meat of thresher and porbeagle is considered similar to that of swordfish and both these species are often marketed in the same form as swordfish meat, as steaks and blocks. Pelagic thresher shark and bigeye thresher shark meat is judged of lower quality as compared to that of thresher shark but it is also widely commercialized¹¹.

Smaller species like picked dogfish and smooth-hounds are particularly appreciated as they contain smaller amounts of urea and mercury than other species and are also easily to process. They do not usually require soaking and the fish are finned, gutted and landed as whole carcasses with the skin intact. The backs are used in Europe and Australia while fresh whole carcasses are sold in South America where they are marketed as *cazon*. The back represents the main body of the fish accounting for 28-30% of the total body weight. This product is exported for sale as fillets, steaks, portions and use in the fish-and-chips trade. The belly flap or nape accounts for an additional 7% of the round weight (meaning whole or live weight). Dogfish are particularly appreciated in Europe, especially in France, UK and Germany.

¹⁰ KREUZER R., AHMED R., *idem*.

¹¹ ROSE D.A., "An overview of world trade in sharks and other cartilaginous fishes". TRAFFIC International, 1996.

Blue shark is considered one of the less preferred species for human consumption due to its soft and strong flavoured meat. It is often caught as bycatch but is usually discarded, often after finning, as there is the risk that the strong odour of its flesh can contaminate that of the other fish caught. Yet, blue shark has a limited market in France, Germany, Spain, and Italy (where is marketed as the more valuable smooth-hound). In Japan blue sharks are used for the preparation of *hanpen* (shark paste) but only if they have been promptly processed within two hours of capture, in order to avoid its strong odour.

Salmon sharks are captured by Japanese longliners and are usually consumed in northern Honshu and in limited amounts in the rest of the country. These species are usually exported together with porbeagles to European markets.

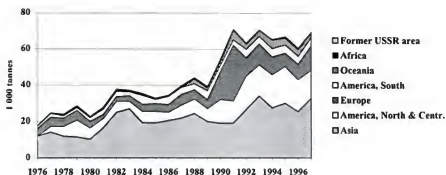
Requiem sharks are widely distributed and represent one of the largest families of sharks. They are also one of the most economically important as many species are used for food, fins, leather etc. Particularly appreciated for the quality of its flesh is the blacktip shark, especially in the USA. Blacktip reef shark (*Carcharhinus melanopterus*) is particularly favoured in Taiwan Province of China as belly meat, but it is also marketed in fresh, frozen, dried or salted form throughout the Indian, Pacific and South Pacific Oceans. Other species eaten are dusky shark, Caribbean reef shark (*Carcharhinus perezi*) and sandbar shark, which is the most important commercial species in the shark fishery of the south-eastern USA, as the quality of its reddish meat and its large fins are valued. Spot tail shark (*Carcharhinus sorrah*) is one of the preferred sharks in the markets of southern India, Maldives and Australia. The whitetip shark is consumed in North America, Europe and Asia. Tiger shark is widely marketed and particularly appreciated in the Caribbean. In the USA, Central and South America blacktip, dusky, sandbar, lemon and nurse sharks are locally consumed.

Large shark species such as tope sharks, winghead shark, longnose and velvet dogfish, are often avoided for human consumption as they can accumulate high levels of mercury and other heavy metal contaminants. Until a few years ago tope sharks had a good market in Italy, which imported them from France. The presence of high levels of mercury in some consignments led to major reductions of these imports. Tope sharks are marketed as whole frozen carcasses in Argentina, Australia and New Zealand and in dried form in Malaysia.

6.1.3 Markets and trade

According to FAO statistics, reported production of fresh, frozen and cured chondrichthyan meat and fillets increased from nearly 18 000 tonnes in 1976 to 34 500 tonnes in 1986 and 69 300 tonnes in 1997. The peak was recorded in 1993 with 70 800 tonnes. In 1997 frozen whole shark represented the major form, followed by cured sharks. In 1997 Pakistan was the main producer of shark meat with nearly 19 000 tonnes of dried, salted or in brine shark, followed by Spain, the USA, Japan, Mexico, New Zealand, Chile and Indonesia. In 1997 Spain was the major producer of frozen whole sharks with 12 100 tonnes, followed by Japan, the USA, Mexico and Indonesia. Production of frozen skate has dropped in the last few years from 26 500 tonnes in 1991 to 3 040 tonnes in 1997. This decline is due to the decrease in production by Portugal. Yield of shark fillets has substantially increased from 140 tonnes in 1976 to 9 820 tonnes in 1994. Since then it has declined to reach 6 800 tonnes in 1997, with the USA as main producer with 4 400 tonnes (2 500 tonnes as fresh and 2 900 tonnes as frozen).

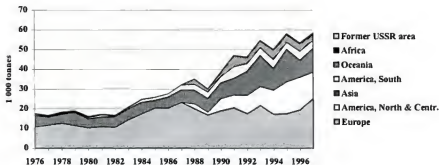
Figure 27 World chondrichthyan production of meat and fillets by continent in 1 000 tonnes 1976-1997



Source: FAO - FIDI.

Exports of fresh, frozen and cured chondrichthyan meat and fillets have grown considerably from 17 600 tonnes, worth US\$22.1 million in 1976 to approximately 58 600 tonnes, valued at US\$131.5 million, in 1997. Whole frozen sharks (including dogfish) represent the main item with 36 200 tonnes, valued at US\$75.0 million, followed by fresh and chilled sharks and frozen shark fillets. In 1997 Spain became the largest exporter with 12 400 tonnes worth US\$27.4 million. Other major exporters were the USA, Japan, UK, Canada, Taiwan Province of China, New Zealand and Indonesia. Japan and Norway were the leading exporters of sharks for many years, especially to the European market.

Figure 28 World chondrichthyan exports of meat and fillets by continent in 1 000 tonnes 1976-1997

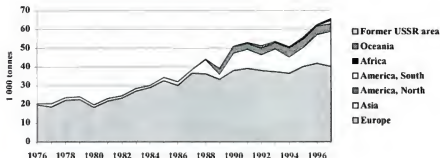


Source: FAO - FIDI.

Imports of chondrichthyan meat and fillets have increased from 20 500 tonnes worth US\$27.5 million in 1976 to 65 800 tonnes, valued US\$160.9 million in 1997. The bulk of the

imports consisted of frozen whole sharks (including dogfish), nearly 38 000 tonnes, valued at US\$91.8 million in 1997, followed by fresh and chilled sharks, frozen skates and frozen chondrichthyans not elsewhere identified. In 1997 Italy was much the largest importer of approximately 14 400 tonnes worth US\$39.9 million. Other main importers were Republic of Korea, France, Spain, UK, USA, Japan, Germany and Netherlands. The European Union is the main importing area according to FAO statistics. This is probably also due to their better recording of this trade as compared to other nations.

Figure 29 World chondrichthyan imports of meat and fillets by continent in 1 000 tonnes 1976-1997



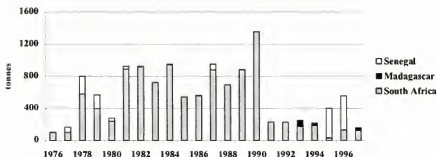
Source: FAO - FIDI.

6.1.3.1 Africa

Shark meat has been traded by various African countries, mainly East Africa and the Indian Ocean islands, for centuries and represents an important source of protein. Chondrichthyans are usually captured in artisanal fisheries. According to FAO statistics, in 1997 African production of elasmobranchs was 160 tonnes (mainly frozen sharks), representing a 71.3% decline as compared to the previous year. South Africa was the main producer with 123 tonnes, followed by Madagascar with 37 tonnes. Exports of shark meat have substantially increased in the last few years, peaking at 990 tonnes worth US\$1.5 million in 1997. The great bulk of the exports consisted of frozen whole shark (902 tonnes, worth US\$1.2 million), followed by fresh or chilled shark (83 tonnes, worth US\$254 000). In 1997 Sao Tome and Principe was the major exporter with 273 tonnes, worth US\$294 000, followed by Guinea Bissau, South Africa, Guinea, Sierra Leone, Angola and Mauritius. These figures show traces of incorrect reporting to FAO. If we consider only EU imports of shark meat and fillets from African countries³², in 1997 they amounted to 3 178 tonnes, worth US\$8.2 million. These figures exceed total African shark exports reported to FAO by nearly 2 200 tonnes. The EU represents the major market for African exports of shark meat but there are other outlets such as Yemen, Saudi Arabia and Japan. In the last nine years exports to Japan have been rather limited except from Kenya and Mozambique. In 1997 Japanese imports from Africa amounted only to 23 tonnes worth US\$78 000. Other African countries that exported to Japan in the last few years were Cape Verde, Côte d'Ivoire, Sierra Leone, Guinea, Gambia and South Africa.

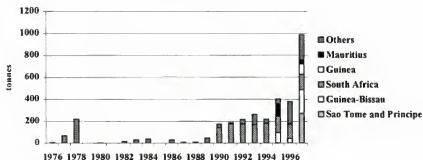
³² Source: EUROSTAT.

Figure 30 Africa: chondrichthyan production of meat and fillets by country in tonnes 1976-1997



Source: FAO - FIDI

Figure 31 Africa: chondrichthyan exports of meat and fillets by country in tonnes 1976-1997



Source: FAO - FIDI

In 1998 South Africa, Mauritius, Namibia and Mauritania were by far the leading African exporters to the EU, as shown in Table 18. In 1998 South Africa supplied 1 390 tonnes worth US\$4.5 million, Mauritius 320 tonnes worth US\$1.1 million, Namibia 235 tonnes, valued US\$333 280 and Mauritania 208 tonnes worth US\$354 900. Other major suppliers were Guinea, Senegal, Côte d'Ivoire and Mozambique. In 1998 Italy was the main outlet for African shark exports taking 1 390 tonnes worth US\$4.1 million. South Africa was the leading supplier, followed by Mauritius, Mauritania, Senegal, Ghana and Kenya. Spain was another major market, taking 1 060 tonnes worth US\$1.4 million. Namibia was its major supplier, providing 235 tonnes, followed by Guinea, Sao Tome and Principe, Côte d'Ivoire, Mozambique and Morocco. Other major markets were Germany, Netherlands and Portugal.

Table 18 EU imports from African countries in tonnes

| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| South Africa | 772 | 906 | 1 273 | 1 254 | 799 | 895 | 553 | 1 022 | 1 320 | 1 058 | 1 387 |
| Mauritius | 34 | 34 | 44 | 81 | 86 | 183 | 159 | 209 | 559 | 516 | 320 |
| Namibia | - | - | 53 | 25 | - | 11 | 56 | 269 | 3 | 6 | 235 |
| Mauritania | 761 | 773 | 987 | 434 | 344 | 220 | 309 | 266 | 503 | 392 | 208 |
| Guinea | - | - | - | - | - | 1 | 1 | 52 | 222 | 93 | 155 |
| Sao Tome and Principe | - | - | - | - | - | - | - | - | 23 | 273 | 153 |
| Morocco | 444 | 432 | 424 | 241 | 280 | 278 | 192 | 160 | 188 | 263 | 132 |
| Senegal | 203 | 598 | 448 | 112 | 155 | 110 | 99 | 153 | 73 | 138 | 106 |
| Côte d'Ivoire | - | 13 | - | - | 1 | 1 | 62 | 1 | 3 | 32 | 91 |
| Mozambique | - | - | - | - | - | - | - | - | - | - | 78 |
| Angola | - | - | - | 7 | - | - | - | 4 | 6 | 41 | 54 |
| Sierra Leone | 42 | 35 | 48 | 69 | 83 | 67 | 11 | - | 79 | 42 | 50 |
| Guinea Bissau | - | - | - | - | 3 | 40 | 129 | 8 | 106 | 216 | 29 |
| Equatorial Guinea | - | - | - | - | - | - | - | - | - | - | 27 |
| Ghana | 4 | 10 | 5 | 28 | 45 | 41 | 43 | 12 | 25 | 50 | 12 |
| Algeria | 1 | - | - | - | - | 2 | - | - | 1 | 4 | 11 |
| Kenya | - | - | - | 35 | - | - | 1 | - | 5 | 1 | 9 |
| Ethiopia | - | - | - | - | - | - | - | - | 2 | 2 | 5 |
| Seychelles | 1 | 2 | - | - | 1 | - | 2 | 9 | - | 2 | 2 |
| Tanzania | - | 2 | - | - | - | - | - | - | - | - | 2 |
| Cape Verde Is. | - | - | - | - | - | - | 25 | - | - | 22 | - |
| Gabon | - | - | - | - | - | - | 23 | - | - | 15 | - |
| Somalia | 1 | 6 | - | - | 4 | 35 | 16 | 18 | 91 | 6 | - |
| Gambia | 14 | 2 | - | - | - | 11 | - | - | - | 4 | - |
| Eritrea | - | - | - | - | - | - | - | - | - | 1 | - |
| Zambia | 1 | - | - | - | - | - | - | - | - | 1 | - |
| Réunion | - | - | 11 | 14 | - | - | 49 | 61 | 102 | - | - |
| Togo | - | - | - | - | - | - | - | 18 | - | - | - |
| Libya | - | - | 2 | 1 | - | - | 1 | - | - | - | - |
| Liberia | - | - | - | - | - | 2 | 1 | - | - | - | - |
| St. Helena | - | - | - | - | - | 1 | - | - | - | - | - |
| Niger | - | - | 5 | - | - | - | - | - | - | - | - |
| Comoros | - | 6 | - | - | - | - | - | - | - | - | - |
| Tunisia | 22 | - | - | - | - | - | - | - | - | - | - |
| Cameroon | 2 | - | - | - | - | - | - | - | - | - | - |
| Uganda | 7 | - | - | - | - | - | - | - | - | - | - |
| Total | 2 309 | 2 819 | 3 300 | 2 301 | 1 801 | 1 898 | 1 732 | 2 262 | 3 311 | 3 178 | 3 066 |

Source: EUROSTAT.

According to FAO statistics, in 1997 African imports of chondrichthyans were nearly 900 tonnes, worth US\$ 1.1 million, of which 875 tonnes of frozen sharks. These imports represent a substantial increase as compared to 3 tonnes in 1989 when imports were reported for the first time. In 1997 Madagascar was the main importer with 575 tonnes, worth US\$ 616 000, followed by Algeria and Mauritius. In Africa, Kenya and Tanzania are major consumers of shark meat, supplied from domestic landings and imports, mainly from Somalia, Yemen and Djibouti.

Mombasa is an important trading centre for dry-salted shark meat. According to Barnett³³, artisanal fishermen eat shark meat extensively in Tanzania and Zanzibar and any catch excess is sold in dried and salted form. Consumption of shark meat in Somalia, Madagascar, South Africa, Seychelles and Eritrea is limited and production is usually exported within the region because supply exceeds domestic demand. According to Lovatelli³⁴, it was estimated that sharks represented about 40% of total Somali fish landings in the mid-1980s and in 1994, although no landing data was available, it is believed that it may have reached 55-65%. He also reports that in Kenya dried and salted meat is sold in units of 16kg and by grades (1-6). Quality, as well as species, determines grades. Grade 1 is the highest quality and includes species such as the bull shark (*Carcharhinus leucas*) and the hammerhead shark. This last species is preferred for exports inside Africa. In the period Lovatelli wrote his report (1996), the export of shark meat from Somalia had dropped considerably since the outbreak of the war mainly because of the reduction in exposed traffic along the coasts of Somalia and absence of active fish traders. Dried/salted shark meat in Eritrea is entirely exported to Saudi Arabia and to East Africa via Yemen. Domestic consumption in Eritrea is mainly of small sharks along the coast.

In Africa domestic consumption of shark meat is often limited to particular coastal areas. Shark meat is preferred fresh but is usually eaten dry-salted because of its longer shelf life and ease of transportation. Ice, cold stores, processing facilities, storing plants and adequate transportation are still scarce in Africa and this results in short shelf lives for fresh marine products. Production of salted and sun dried shark meat does not require sophisticated processing and storage facilities. The typical product form is simply dried as salt is often quite expensive. The quality is frequently poor as fish drying is often done directly on the beach. The value of dried shark meat is generally half that of fresh shark meat. In the countries where the infrastructure does exist, production of frozen sharks is mainly destined for export, to Europe in particular. Consumption of shark meat is not very high due also to the African preference for meat instead of fish. Although there has been an increase in consumption of fish in the last decennium, meat is still preferred and the per capita supply of fish in Africa remains low compared to other areas of the world. According to FAO statistics³⁵, in 1995 the per capita supply of fish in Africa was only 6.9kg per annum, compared with 19.5kg in Oceania, 18.6kg in Europe, 17.2kg in Asia, 17.0kg in North America, 10.1kg in South America and a world average of 15.3kg.

6.1.3.2 Europe

According to FAO data, European countries represent the major markets for shark meat. This role has become more evident in the thirty years under survey. In 1997 European production was 13 400 tonnes, imports were 40 200 tonnes (worth US\$98.1 million) and exports were 25 300 tonnes (worth US\$62.5 million). These figures represent a substantial increase compared to 1976 when production was 4 050 tonnes, imports 19 800 tonnes (worth US\$26.9 million) and exports 10 900 tonnes (worth US\$13.3 million).

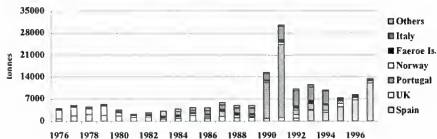
³³ BARNETT R, "The shark trade in mainland Tanzania and Zanzibar" in "Shark fisheries and trade in the western Indian and southeast Atlantic oceans", in "The World trade in sharks: a compendium of TRAFFIC's regional studies", volume I, TRAFFIC, 1996.

³⁴ LOVATELLI A., "EC rehabilitation programme for Somalia. Artisanal fisheries: Final Report", European Commission Somalia unit, Nairobi, Kenya, 1996.

³⁵ LAURETI E., "Fish and fishery products: world apparent consumption statistics based on food balance sheets (1961-1995)", FAO Fisheries Circular No. 821, Revision 4, Rome, 1998.

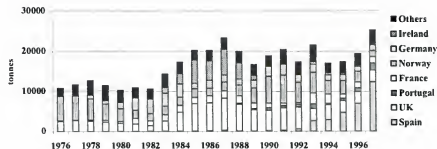
In 1997 the EU imported nearly 40 000 tonnes, valued at US\$97.6 million, representing 99.5% in volume and 99.4% in value of the total European imports. Italy was by far the leading importer (14 400 tonnes worth US\$39.9 million) followed by France (7 300 tonnes, US\$17.6 million), Spain (7 200 tonnes, US\$11.4 million), UK (2 800 tonnes, US\$6.4 million), Germany (2 200 tonnes, US\$6.2 million) and Netherlands (1 960 tonnes, US\$8.1 million). According to EUROSTAT statistics, in 1997 the USA was the major supplier to the EU, 8 600 tonnes, worth US\$20.5 million. Other major non EU suppliers were Singapore, Norway, South Africa, Canada, Japan, Panama, Argentina, Honduras, Mauritius and China. Spain was by far the major exporter with 12 390 tonnes worth US\$27.4. Other exporters were UK, Portugal, France, Norway, Germany and Netherlands. In 1997 the EU exported nearly 23 000 tonnes of shark, worth US\$58.5 million, representing 90.7% in volume and 93.5% in value of the total European exports. Exports of shark meat from EU countries are mainly intra-EU trade (72.7% in 1997). In 1997 EU exports to non-EU countries were directed mainly to Mauritius, Uruguay, Seychelles, Hong Kong and Madagascar.

Figure 32 Europe: chondrichthyan production of meat and fillets by country in tonnes 1976-1997



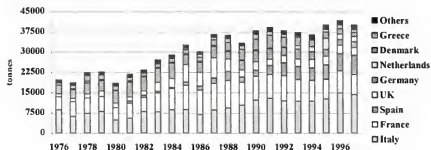
Source: FAO - FIDI.

Figure 33 Europe: chondrichthyan exports of meat and fillets by country in tonnes 1976-1997



Source: FAO - FIDI.

Figure 34 Europe: chondrichthyan imports of meat and fillets by country in tonnes 1976-1997



Source: FAO - FIDI

In France, UK, Germany and other Northern European countries picked dogfish is the favoured species, while smooth hounds and mako sharks are preferred in southern Europe. Shark meat is usually consumed in form of fillets and steaks but in Germany there is a preference for bellies, backs and *Schillerlocken* (smoked belly flaps).

According to FAO statistics, Italy is far and away the leading world importer of sharks, followed by France and Spain. In 1997 more than 80% of Italian shark imports came from European countries, with Spain as the major supplier. 83% of the imports were not dogfish shark species, but porbeagle, smooth hounds etc. The great bulk of Italian shark imports are in frozen dressed-carcase form, which are processed in the country and sold as frozen steaks or fillets. Regions of North Italy show higher consumption and preference for sharks. Italian exports of sharks have always been rather marginal. In 1997 Italy exported less than 290 tonnes (worth US\$786 000) according to EUROSTAT figures. Major countries of destination were Greece and Spain. Italy represents the major European market for smooth hounds (*Mustelus* spp.), which are sold as *palombo*. Other preferred species are *smeriglio* (mako shark but often also porbeagle), *gattucci* (catsharks), *spinaroli* and *cani spellati* (picked dogfish).

France is the major European consumer of shark and skate meat, which is provided by domestic landings and imports. It is second largest importer of shark meat in the world after Italy. French imports have increased substantially since 1976 when they were 4 700 tonnes worth US\$6 million. France is the principal importer of dogfish in Europe. Picked dogfish comprised 89.8% of French imports of sharks in 1997. Nowadays the USA is the major supplier of sharks to France; in the past Norway played this role. The great bulk of French imports are backs and whole (head-off, tail-off, skin-off, gutted). In 1997 France exported 1 560 tonnes worth US\$6.2 million. Most of the exports are directed to other EU countries with Italy as the major outlet.

The Spanish market for elasmobranchs is steadily expanding with recent growth in production, imports and exports. According to FAO statistics, in 1997 Spain was the leading exporter and the fourth largest importer of elasmobranchs in the world as far as volume is concerned. Spanish exports of fresh and frozen sharks have climbed from 1 tonne (worth US\$5 000) in 1981 to nearly 12 400 tonnes (worth US\$27.4 million) in 1997. In 1997 Spain

imported nearly 7 200 tonnes valued at US\$11.4 million. Shark meat is usually marketed skinned and gutted as steaks and fillets. Shortfin mako shark (*marrajo*) is the most favoured species, followed by thresher shark, tope shark (*cazón*), smooth hammerhead, smooth hound, picked dogfish and bigeye thresher shark. Other less valuable species are small-spotted catshark, kitefin shark, gulper sharks and blue sharks. According to EUROSTAT data, in 1997 nearly half of Spanish shark exports were directed to other EU countries plus significant amounts to Mauritius, Uruguay, Seychelles, Hong Kong, and Madagascar.

UK is one of the major European markets for picked dogfish, which are supplied by domestic landings and imports. UK shark imports were particularly strong in the mid-1980s when they peaked at 7 400 tonnes in 1987. Recently they have declined. In 1998 they were nearly 3 170 tonnes, worth US\$7.8 million, with 72.2% of the imports were picked dogfish. Nowadays the USA is by far the major supplier followed by Ireland and Faeroe Islands. In the past Norway was the traditional exporter of picked dogfish to the UK. Much of the imports of fresh, whole dogfish are directed to the processing industry. Only small quantities of the processed products are for the domestic market as they are often re-exported to other European countries such as France, Belgium and Germany. The German market mainly imports belly flaps from the UK, which are then smoked to obtain the *Schillerlocken*, a typical German product. Domestic landings of picked dogfish are usually for domestic consumption, mainly in the fish and chips trade, especially in southern England. UK exports a significant proportion of its production, and also re-exports sharks after processing. UK exports have declined substantially in the last few years, particularly since 1993 when a year on year decrease of 52% was experienced. In 1998 exports were nearly 990 tonnes, worth US\$ 3.5 million. The decline of exports is due to the increase in the US supply of picked dogfish to France, which continues to represent the principal market for UK exports of fresh whole picked dogfish. In 1998 other major markets for UK exports were Italy, Germany and Singapore.

German imports of elasmobranch have declined considerably in the last few years. They were particularly high in the early 1980s, peaking at 5 700 tonnes in 1984 according to FAO statistics. In 1997 most of the 2 200 tonnes imported were picked dogfish and catsharks, mainly in whole frozen form. In the past Japan was the major supplier to the German market but in 1997 this role was taken by South Africa, followed by the USA, Japan, Singapore, Canada and Uruguay. Most imported picked dogfish is for domestic consumption while other shark species, such as *Carcharhinidae*, are usually imported frozen whole and then processed and re-exported to other European countries. In Germany smoked picked dogfish backs and frozen sharks steaks of porbeagle and mako are particularly appreciated. Smooth hound also has a good market. Other species marketed are nursehound, blue shark and angelshark. There is a preference for belly flaps, generally used for smoking (*Schillerlocken*) but they are also sold fresh and frozen, skinned. Belly flaps are produced during the dressing of the fish and are individually skinned and washed prior to freezing. The preferred sizes are at least 30cm long and 1.25 cm wide¹⁶. Exports of sharks were larger in the early 1980s, peaking at nearly 3 600 tonnes in 1982. In 1997 they were about 1 400 tonnes, worth US\$3.2 million. In 1997 most German shark exports were frozen and were only sent to countries within Europe. Italy was the main destination, followed by UK, Belgium and Austria.

For many years Norway was one of the major supplier of dogfish and other sharks to European countries, mainly to France, UK and to Denmark, which re-exported the totality of its

¹⁶ KREUZER R., AHMED R., *idem*.

shark imports to other EU countries. Home consumption of sharks is very limited and most of its catch is exported. Norwegian catches and exports of sharks were particularly significant until the early 1970s and during the 1980s. The decline in catches was due to problems linked with overfishing in previous years, the Italian policy on mercury contamination and fluctuations in the exchange rates. In 1997 Norwegian exports of fresh and frozen sharks and skates were 1 530 tonnes, worth US\$2.4 million, of which the great bulk were fresh picked dogfish. Denmark represents the main outlet for these exports

Facing scanty domestic landings of sharks and other elasmobranchs, Netherlands and Denmark are important shark traders, confirming their roles, together with Belgium, as gateways to Europe. In 1997 Dutch shark meat exports were 1 070 tonnes worth US\$5.2 million. These exports were mainly frozen and 74.6% were not dogfish sharks. Netherlands exported sharks only to other EU countries with Italy receiving 89.1% of them. Imports of sharks to the Netherlands in the same year amounted to 1 960 tonnes worth US\$8.1 million. Major suppliers were Canada (460 tonnes), the USA (375 tonnes), Italy (330 tonnes), Singapore (310 tonnes) and Mauritius (250 tonnes). In the past few years other major non-EU exporters of shark to Netherlands were Japan (1 380 tonnes in 1994), Ecuador, South Africa, Reunion, Trinidad and Tobago, Brazil, Chile, Uruguay and Taiwan Province of China. Dutch imports of sharks have increased considerably in the 1990s, from 170 tonnes in 1990 to nearly 4 200 tonnes in 1995 but they have declined in the following two years.

Danish exports have declined in the last few years from nearly 2 000 tonnes worth US\$8.9 million in 1993 to 890 tonnes worth US\$4.5 million in 1997. Fresh dogfish represented 85.9% of 1997 exports and 95.3% of them were directed to other EU countries, with Italy as the main outlet. In 1997 Danish imports were about 1 500 tonnes, worth US\$2.6 million. The great bulk of the imports consisted of fresh dogfish and 85.2% of the imports came from Norway. In previous years other suppliers were Sweden, Japan, Singapore and Faeroe Islands.

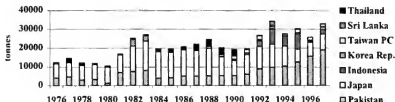
In 1997 Portugal exported 1 760 tonnes of sharks worth US\$2.8 million, directed to Spain and Italy. Spain was the major supplier of imports, which amounted to 650 tonnes worth US\$ 1.1 million in total.

6.1.3.3 Asia

Asian countries sustain the leading chondrichthyan fisheries. In 1996 their catches represented 55.4% of total world landings of these species. Consumption of and trade in chondrichthyan meat is rather limited. Shark meat is usually used in dried and salted form in India, Pakistan and Sri Lanka, while in East Asia it is generally used in the production of fish balls, tempura, surimi, fish sausage, fish ham, fish cakes and fish paste. According to FAO statistics, production of chondrichthyans by Asian countries amounted to nearly 33 000 tonnes in 1997, with Pakistan being by far the main producer with 19 000 tonnes. Other major producers were Japan, Indonesia, Republic of Korea and Taiwan Province of China. In 1997 Asia exported over 11 900 tonnes of chondrichthyans worth US\$23.2 million. Japan was the major exporter with 3 200 tonnes, worth US\$9.5 million, followed by Taiwan Province of China, Indonesia, Republic of Korea, Singapore and India. Asian imports of chondrichthyan meat and fillets have increased impressively since 1976 and particularly in the 1990s. They grew from 713 tonnes, worth US\$597 000 in 1976 to 18 900 tonnes, valued US\$52.4 million, in 1997.

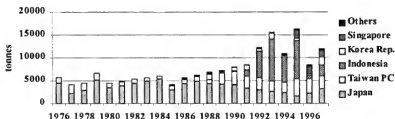
Republic of Korea was the largest importer with 14 300 tonnes, followed by Japan, Singapore, China, Taiwan Province of China and Thailand.

Figure 35 Asia: chondrichthyan production of meat and fillets by country in tonnes 1976-1997



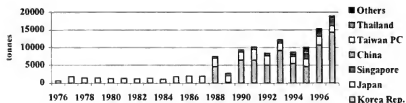
Source: FAO - FIDI

Figure 36 Asia: chondrichthyan exports of meat and fillets by country in tonnes 1976-1997



Source: FAO - FIDI

Figure 37 Asia: chondrichthyan imports of meat and fillets by country in tonnes 1976-1997



Source: FAO - FIDI

In Japan shark meat is mainly eaten in the form of processed products, such as fish balls, fish cakes, fish sausage, tempura, surimi, fish ham and fish paste. Shark meat is rarely consumed fresh, boiled or dried. Japan is a significant trader in fresh and frozen shark meat. Major suppliers

to the Japanese market are Spain, Canada, Ecuador and the USA. Exports of frozen sharks are directed to China, Republic of Korea, Peru and Spain, while frozen fillets are destined for Singapore, Republic of Korea, Mauritius, Germany and Italy. Makos, thresher and *Carcharhinidae* sharks have a higher economic value on the Japanese market compared with other species. The price of shark meat is not very high. According to Kreuzer and Ahmed, *hoshi zame* (*Mustelus manazo*) is a popular shark species in Japan. It is chopped up fresh and boiled in water then eaten with a vinegar and bean paste. It is also sometimes salted and dried and then cooked the same way. *Nezumizame* (*Vulpecula marina*) is boiled and sometimes roasted. Shark ovaries are used to prepare *atsuyaki*, a kind of fish paste³⁷. In North Japan limited amounts of sharks are consumed in steak form, and the favoured species are those with fibrous meat, such as hammerhead and picked dogfish. For more information on Japan see the Japanese section.

In China shark meat is consumed in different ways such as fried, soup and fish balls. It is estimated that over half the sharks landed in China are processed into fillets and fish balls. Most of the production is for local consumption. Exports of shark meat are limited. In 1998 they amounted to 42 tonnes, directed only to Japan. In China shark meat is processed into canned meat, salted meat and shark meat balls. Large sharks are preferred for the production of shark meat balls and canned shark meat. China imports small quantities of shark meat, mainly from other Asian countries such as Japan, Singapore, Republic of Korea, Thailand and from Spain and Norway. In 1998, 310 tonnes (worth US\$2.4 million) of fresh and frozen shark meat were imported. Spain was the major supplier with 160 tonnes worth US\$1.1 million. More information on the Chinese market for chondrichthyan can be found in Appendix IV 4.

In Taiwan Province of China shark meat is used fresh, dried, smoked, and processed in minced products and also added to certain fish jelly products. Fish balls and tempura are particularly appreciated but the use of shark meat for making these products has decreased in the last decennium. Most of the domestic landings of sharks are exported. According to FAO statistics, in 1996 Taiwan Province of China was the major Asian exporter of shark meat, with 3 100 tonnes worth US\$4 million, a role that now has been taken by Japan. In 1997 its exports were 2 800 tonnes, valued at US\$4.5 million, of which 1 700 tonnes as frozen and 1 100 tonnes as fresh. Among major foreign markets are the USA, Uruguay, Republic of Korea, Philippines, Singapore and UK. Frozen fillets are usually destined for export markets such as Japan and Europe. A limited amount of shark in fresh or frozen form is also imported. In 1997 this amounted to 375 tonnes worth US\$844 000. Among major suppliers are the Philippines, India, Australia and Greenland. Meat for domestic use and that for exports are processed in different ways. Sharks are skinned, headed and gutted, finned, and the cartilage is removed for both markets. For meat destined for the internal market the carcass is then cut into pieces, washed and frozen in 36kg blocks, while for the foreign market the carcass is cut into two pieces, which are then classified according to weight (40-49lbs³⁸ and over 50lbs), frozen and packed³⁹. According to Mao⁴⁰, the meat of whale and thresher sharks is eaten. The area anterior to the dorsal fin or

³⁷ GORDIEVSKAYA V.S. "Shark flesh in the food industry", US Department of Commerce, National technical information service, Springfield, 1973.

³⁸ 1lb (pound)=454g

³⁹ TSAI C.H., "Frozen shark" in WU C.S. (ed.), "The status of Taiwan's fishery processing industry", Taiwan Province of China Fishery Bureau, Taipei, 1990, in Chinese, reported by CHEN G.C.T., LIU K.M., JOUNG S.J., PHIPPS M.J., "TRAFFIC report on shark fisheries and trade in Taiwan", in "The world trade in sharks: a compendium of TRAFFIC's regional studies, vol. I, TRAFFIC, 1996.

⁴⁰ MAO, J.J., "Shark products and processing in southern Taiwan: a TRAFFIC East Asia-Taipei field report", Unpublished report (in Chinese), reported by CHEN G.C.T., LIU K.M., JOUNG S.J., PHIPPS M.J., idem.

between the anal fin and the caudal fin is judged as the best. The belly meat of the blacktip reef shark (*Carcharhinus melanopterus*) is considered to be the most exquisite.

Hong Kong is the world's leading trading centre for shark fins and a significant consumer of shark fins but consumption of shark meat is not very high. Shark meat is involved in the production of fish balls, which are used in the preparation of certain Chinese dishes and often exported to other neighbouring countries. About 20-40% of shark meat was normally added to the cheaper varieties of fish balls. It was used in filling vegetable and soya bean products called *yeung tau fu*. However, with the increase in the price of shark meat it became uneconomical and shark meat has not been used for making fish balls in Hong Kong for at least two years. Traditionally the consumption of shark and ray meat in Hong Kong was not widespread. The poor and persons who lived on the waters ate them. Shark or rays were not even included in foods sold in budget eating places and definitely not in the more classy restaurants. When Hong Kong embarked on an aggressive programme of land reclamation to house its people, some groups, in particular the *Tung Kah* who mostly lived in boats, dispersed as a community and the eating of sharks in households seemed to disappear. However, it could be reviving, despite its traditional association with poverty, which Hong Kong persons are careful to avoid. Consumption of sharks and rays appear to be linked loosely with the different dialect groups among the Chinese. In Hong Kong, where about 98% of locals are Chinese, mainly from nearby Guangdong Province, eating shark meat is not fashionable. Imports of shark meat are very scanty and are destined mainly for re-export. Little shark meat is consumed as fillets or steaks. More information on the Hong Kong shark market can be found in Appendix IV.1.

Singapore represents the most significant trading nation in Southeast Asia. As far as sharks are concerned, Singapore is more involved in the trade and consumption of shark fins as domestic consumption of shark meat is negligible. Singapore's shark exports have only been reported to FAO since 1995. In 1997 they amounted to nearly 1 600 tonnes, worth US\$5.7 million. In the same year 1 400 tonnes were imported, valued at US\$4.7 million. Singapore exports shark meat to other Asian countries and to the EU. According to EUROSTAT statistics, in 1997 Singapore exported nearly 1 500 tonnes, worth US\$4.3 million, to the EU. Italy was by far the main outlet, taking 790 tonnes, followed by the Netherlands (310 tonnes), Germany (195 tonnes) and Greece (180 tonnes). Other information on the Singapore market is provided in Appendix IV.2.

According to Kreuzer and Ahmed⁴¹, the negligible consumption of shark meat in Malaysia is due to the religious sentiment of a substantial element of the population. Statistics on exports of shark meat have been reported since 1991 when they stood at 34 tonnes worth US\$42 000. Exports have not been very regular and in 1997 they amounted to 35 tonnes, worth US\$15 000. Major markets for Malaysian shark are Taiwan Province of China, Singapore, Hong Kong and, in the past, also UK. Malaysia imports negligible volumes of shark meat; only 28 tonnes worth US\$292 000 in 1997. Taiwan Province of China is the major supplier, followed by New Zealand. In the last few years other exporter countries have been Canada, Sri Lanka, Australia and Japan. More information on the Malaysian market can be found in Appendix IV.2.

In 1997 Republic of Korea was the second largest importer of chondrichthyan meat and fillets. Its imports have increased substantially in the last few years going from 4 600 tonnes, worth US\$3.8 million, in 1988 to 14 340 tonnes, valued at US\$ 25.9 million in 1997. In 1997

⁴¹ KREUZER R., AHMED R., *idem*.

the great bulk of the imports consisted of frozen skates (8 550 tonnes, US\$ 17.6 million), followed by frozen chondrichthyans not specified (3 100 tonnes, US\$3.5 million) and frozen sharks (2 700 tonnes, US\$4.8 million). Taiwan Province of China was by far the main supplier of frozen sharks with 800 tonnes, valued at US\$2 million, followed by Singapore, Japan, Peru, New Zealand and Spain. In the previous years New Zealand has been the major exporter of shark meat to Republic of Korea. Shark meat does not possess a high economic value in the Republic of Korea but prices there are higher than in other East Asian countries. Shark meat is consumed by ordinary people but it is also eaten in the ancestral worship ceremony, particularly in Kyongbuk Province⁴². In 1997 Republic of Korea produced 1 610 tonnes of chondrichthyans not specified and only 39 tonnes of frozen sharks. In 1997 exports were 1 660 tonnes, worth US\$1.8 million of which 39 tonnes, valued at US\$28 090 were shark meat that went to China and Japan. In previous years exports of shark meat have been mainly directed to Japan and European countries such as Italy and Spain.

Indonesia is one of the major world's catching countries for chondrichthyans. Much of Indonesian shark fisheries are small-scale fisheries with relatively small canoes and simple gear. Sharks are also captured, usually as bycatch, by industrial fisheries. While some shark species are caught for their meat (e.g. dogfish captured in the North Atlantic), most of the shark catch targets fins and tails (*ekor ikan hiu* in Indonesian). Recently there has been an increase in the capture of deep-sea sharks for liver oil and squalene. Shark meat is not particularly appreciated for domestic consumption but it is eaten, mainly dried, by the ordinary people. Shark meat is usually processed into dry-salted or boiled-salted (*pindang*) commodities. The Research Institute for Fish Technology in Jakarta explored different methods of shark utilisation, such as processing it into commodities including *abon* (shredded, spiced and dried), *dendeng* (spiced-dried satay), fish balls and sausage. Exports of shark meat have only been reported since 1990 when they amounted to 240 tonnes worth US\$108 000. These exports increased substantially to peak at 9 300 tonnes (valued US\$5.6 million) in 1993. Indonesian exports dropped to about 800 tonnes worth US\$240 000 in 1996 but in 1997 a year on year increase of 204% was experienced and exports were 2 370 tonnes, worth US\$740 000. Exports of shark meat are mainly directed to other Asian countries, with the great bulk exported to Taiwan Province of China and China and small quantities to Japan, Singapore and Europe (mainly UK). Exports of shark meat in non frozen form are not reported to FAO. Exports of fresh sharks are mainly directed to Taiwan Province of China and dried shark meat is exported to Hong Kong, Singapore, Malaysia and Japan, while Singapore is the main market for exports of brined shark meat. Small quantities of shark meat are imported in dried and brined form.

In Thailand shark meat is considered of poor quality and it is mainly consumed by less wealthy people. Shark flesh is usually eaten in salted or sweetened form and processed in fish balls that are popular among the Thais. Exports of shark meat are directed to Singapore, China and, in previous years, to European countries such as Greece, Italy and Sweden. In 1997 exports were less than 500 kilograms, while in 1996 Thailand exported 200 tonnes, valued at US\$503 000, of frozen sharks of which 94.4% went to Singapore and the rest to Hong Kong. In the same year 415 tonnes of frozen sharks were imported. Canada was by far the main supplier with 180 tonnes, followed by Denmark, Germany, the USA and Australia. In 1997 Thai imports of shark meat were 300 tonnes, worth US\$ 342 000.

⁴² KANG S., pers. comm., 1996 in PARRY-JONES R. "TRAFFIC report on shark fisheries and trade in the Republic of Korea", TRAFFIC report on shark fisheries and trade in the East Asian region, TRAFFIC, 1996

India is the world's leading catching country for chondrichthyans. Shark meat is usually consumed dried and salted and domestic consumption is not very high. The great demand is in Kerala where shark meat represents a staple diet for poor people. Shark meat is essential to the wedding parties of the Edavar (a tribe from North Malabar) and Muslims mainly of Calicut region⁴³. In 1996 India exported 950 tonnes (worth US\$3.9 million) of chondrichthyans of which 580 tonnes (worth US\$512 000) were frozen sharks and 370 tonnes (worth US\$3.3 million) were dried, salted or in brine elasmobranch not identified. In the period April 1996-March 1997⁴⁴, exports of frozen whole sharks amounted to 40 tonnes and were directed only to the UK. Exports of 136 tonnes of frozen shark fillets went mainly to the UK, followed by China, Hong Kong, Singapore, United Arab Emirates and Switzerland. Indian exports reported by FAO statistics are incomplete: 40 tonnes in 1996 and 142 tonnes in 1997.

Pakistan was the leading world producer of shark meat in 1997 according to FAO statistics, with 19 000 tonnes of dried, salted and in-brine sharks. No export statistics are available as dried, salted and in-brine shark meat is included with other fish species. In 1997 Pakistan reported only less than 500 kilograms of exports of fresh and frozen shark meat to FAO.

6.1.3.4 North and Central America

Production of elasmobranchs by North and Central American countries has increased considerably, particularly in the last decennium, and peaked at 20 200 tonnes in 1995 to decrease since then. In 1997 15 600 tonnes were produced, of which 65.1% was from the USA. Other major producers are Canada and Mexico. Exports have skyrocket since 1981, going from 5 tonnes (worth US\$13 000) to 13 400 tonnes (worth US\$31.1 million) in 1997. The USA is by far the major exporter with more than 9 200 tonnes, worth US\$23.7 million. Other significant exporters were Canada, Costa Rica and Mexico. In 1997 imports were more than 3 900 tonnes, worth US\$ 7.0 million. The USA was the leading importer with 2 600 tonnes, valued at US\$5.2 million, followed by Canada, Mexico and Guatemala.

The USA has become an important consumer and trader of shark meat, which has only quite recently received wide consumer acceptance as seafood there. Before the 1970s shark meat consumption in the USA was rather limited, with small markets in coastal areas which were supplied by small local fisheries. US shark production increased considerably in the last few years, to a maximum of nearly 15 000 tonnes in 1995, but has subsequently declined. In 1997 US production was nearly 10 200 tonnes of which 4 700 tonnes were frozen sharks, 2 900 tonnes frozen shark fillets and 2 500 tonnes fresh or chilled shark fillets. Mako, common thresher, Pacific angel shark, soupfin, bonito, blacktip and sandbar are the preferred species for domestic consumption. Despite various attempts to encourage domestic consumption of dogfish, this product is not appreciated in the USA where it is marketed as "grayfish". Dogfish are imported fresh from Canada and after processing they are re-exported mainly to Europe (France, UK, Germany etc.). Imports of other shark species come mainly from Mexico, Ecuador, Canada, and other Central and Latin American countries. Most exports are directed to the EU and consist mainly of picked dogfish; larger specimens are preferred. Other important destinations for US

⁴³ FAHMEEDA HANFEE, "The trade in sharks and shark products in India: a preliminary survey", TRAFFIC India

⁴⁴ "Monthly statistics of the foreign trade of India". Vol I Exports and re-exports. Directorate general of commercial intelligence & statistics. Ministry of commerce. Government of India. Calcutta. 1997.

shark exports are Hong Kong, Republic of Korea, Thailand, Singapore and Mexico. More information on the US market for sharks is provided in the US section

Shark meat is not widely consumed in Canada. Mako shark is the most favoured shark species for local consumption and it is also exported in steak form to the USA. Porbeagle, blue sharks and dogfish are usually exported to Europe. Dogfish are also exported to the USA, mainly fresh, where they are processed and re-exported, primarily to Europe. There is at least one company that produces dried salted blue sharks for the West Indies and Africa⁴⁵. In 1997 Canada produced 1 230 tonnes of frozen sharks and exported 2 800 tonnes, valued at US\$4.6 million of which 1 610 tonnes of fresh sharks and 1 230 tonnes of frozen sharks. In 1997 the USA was the only market for fresh sharks, while in the previous years small quantities were also directed to France, Japan, UK, Belgium and the Netherlands. Japan was the main destination for Canadian frozen sharks followed by France, Netherlands, Germany, Hong Kong, Republic of Korea and Thailand. In 1997 Canada imported 690 tonnes, worth US\$1.4 million of fresh and frozen sharks. The Canadian Government supported the fishing industry to stimulate the production and marketing of picked dogfish.

In Mexico consumption of shark meat is widespread. It is marketed fresh, frozen, smoked, dried and salted. Shortfin mako and thresher sharks are particularly appreciated and are usually headed and gutted and then frozen for export or processed into fillets, dried and salted for the domestic market. Small shark species are usually sold fresh and whole. Tiger and nurse sharks are generally sold in local markets as dried and salted fillets. In 1997 Mexico produced 4 200 tonnes of sharks of which 3 350 tonnes as frozen, and 870 tonnes as dried, salted or in brine. There is a significantly important trade in sharks between Mexico and the USA. Mexican exports are entirely directed to the USA and probably consist of shortfin mako, thresher, bigeye thresher and pelagic thresher⁴⁶. In 1997 Mexico exported 570 tonnes, worth US\$559 000, and imported 222 tonnes, valued at US\$207 000, of fresh and frozen sharks.

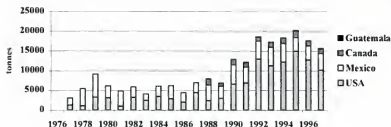
Sharks represent a little used marine resource in the Caribbean where they are often regarded as low status fish with the exception of Trinidad and Tobago. Here the most popular shark product is salted dried, which is used as a substitute for salted dried cod, very popular in the Caribbean. Other products used are fresh, frozen, salted sun-dried shark fillets, sea-ham (hot-smoked shark fillets). Freshly smoked "sea-ham" served in sandwiches or as party-bites is widely accepted and shark meat is prepared in many ways such as fried with lime, onions or garlic. Curried shark is favoured by Creoles and East Indians who prepare the meat with the traditional spices. A popular snack is fried shark combined with a hot roll or bun called *hops*, spices and a hot sauce⁴⁷. The most popular shark species available in Trinidadian fish markets is the small blacktip shark (*Carcharhinus limbatus*), while the bull shark is considered the most valuable. Other common species are hammerheads.

⁴⁵ ROSE D., "Shark fisheries and trade in the Americas", TRAFFIC, North America, 1998.

⁴⁶ ROSE D., 1998, *idem*.

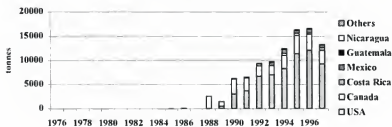
⁴⁷ ADAMS J.E., "The much maligned shark: A study of shark consumption in the south-eastern Caribbean", from "Ecology of food and nutrition", vol. 19, Gordon and Breach Science Publishers, Inc., UK, 1986

Figure 38 North and Central America: chondrichthyan production of meat and fillets by country in tonnes, 1976-1997



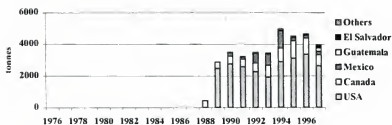
Source: FAO - FIDI

Figure 39 North and Central America: chondrichthyan exports of meat and fillets by country in tonnes, 1976-1997



Source: FAO - FIDI

Figure 40 North and Central America: chondrichthyan imports of meat and fillets by country in tonnes, 1976-1997

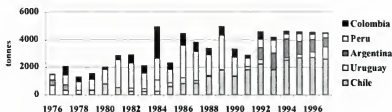


Source: FAO - FIDI

6.1.3.5 Latin America

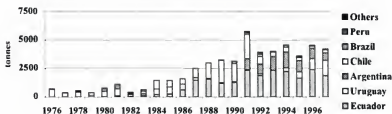
In Latin America⁴⁸ domestic consumption of shark meat is significant in Argentina, Uruguay, Brazil and Peru. Fresh or chilled fillets and salted dried cuts are the preferred product forms. Fillets have their own market niches, while the latter have a limited and seasonal consumption as a substitute for imported products. Steaks are often sold under the names of more expensive fish such as tuna. Exports consist mainly of whole eviscerated, headed and gutted and fillets in fresh or frozen forms. Elasmobranch production by Latin American countries was 4 500 tonnes in 1997, according to FAO statistics. Chile was by far the main producer with 2 600 tonnes of which 2 460 tonnes were frozen skates. Other major producers were Uruguay, Argentina, Peru and Colombia. Exports of elasmobranchs amounted to 4 200 tonnes, worth US\$6.9 million. They have increased significantly since the mid-1980s. In 1997 Ecuador was the main exporter with 1 900 tonnes, followed by Uruguay, Argentina and Chile. In 1997 imports were 1 840 tonnes, worth US\$2.1 million, representing a substantial increase as compared to the 354 tonnes, valued at US\$355 000 in 1996. Uruguay was by far the main importer, accounting for 70.7% of total imports, followed by Brazil and Venezuela.

Figure 41 South America: chondrichthyan production of meat and fillets by country in tonnes, 1976-1997



Source: FAO - FIDI.

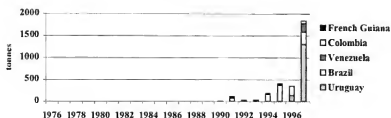
Figure 42 South America: chondrichthyan exports of meat and fillets by country in tonnes, 1976-1997



Source: FAO - FIDI.

⁴⁸ Part of the following information on the Latin America countries is extracted from the study of CARO ROS J.S., "Sharks and rays in Latin America", Appendix IV.5.

**Figure 43 South America: chondrichthyan imports of meat and fillets by country
In tonnes, 1976-1997**



Source: FAO - FIDI.

Brazil is the main market for shark products in Latin America. About 90% of its landings are sold fresh or chilled, from the simple eviscerated to fillets, while frozen products are destined for export. The wholesale markets in Sao Paulo and Rio de Janeiro mainly offer eviscerated products. Processing of dried/salted skate and angelfish wings is very extensive. Salted/dried shark fillets are traditional products, used as a substitute for the Norwegian cod klipfish. In 1997 Brazil imported 280 tonnes, valued at US\$352 000 and exported 37 tonnes, worth US\$38 000.

Ecuador was the main Latin American exporter of elasmobranchs with 1 900 tonnes worth US\$3.2 million in 1997. These exports mainly consisted of frozen (62.5%) and fresh (37.4%) dogfish. The main markets for these exports are the USA, Europe and Japan.

In Argentina the domestic market for shark meat is usually limited to major cities, in particular to Buenos Aires. Fresh fillets can be easily found in shops and supermarkets with smooth hounds as the preferred species followed by angel shark (*Squatina argentina*). A limited and rather artisanal production of dried/salted shark meat (mainly smooth hounds) takes place during the Lent period for Holy Week sales, as a substitute for Norwegian klipfish. In 1997 Argentina exported 680 tonnes of sharks worth US\$1.1 million, mainly to Brazil, Italy and Spain, mostly in the forms of frozen headed and gutted and fillets. The main species exported were smooth hounds and vitamin/tope sharks (*Galeorhinus vitaminicus*). In 1997 Argentina produced 670 tonnes of frozen and dried, salted or in brine sharks.

In Chile the most common products from sharks are headed and gutted (*troncos*) and steaks (*rodajas*). Domestic consumption of shark is not very high. Sharks are usually marketed fresh and often under the name of swordfish. According to Caro Ros⁴⁹, in the period Jan-Nov 1997, Chile exported about 2 200 tonnes of elasmobranchs worth US\$6.1 million. The bulk of these exports consisted of skate. Frozen skate wings are exported to Spain, Republic of Korea and France. Exports of sharks as frozen headed and gutted and steaks were directed to Europe (Italy, Netherlands, Spain and Germany), Japan and the USA. There are also small exports of fresh/chilled elasmobranchs to the USA and of salted/dried cuts to other Latin American countries (Brazil, Ecuador and Bolivia). FAO statistics do not report Chilean exports of skates and in 1997 exports of sharks of this country were 275 tonnes, worth US\$ 637 000.

⁴⁹ CARO ROS J.S., *idem*.

Most of the Peruvian catch of elasmobranchs is for the domestic market as fresh/chilled whole fish or fillets. Consumption of cured products has its peak period during Holy Week. Spain is the main market for Peruvian shark. The most representative product is frozen headed and gutted, individually wrapped in plastic bags. In 1997 Peru exported only 11 tonnes, worth US\$16 000 of shark products.

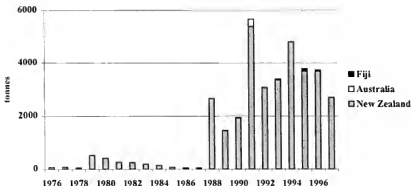
In Uruguay consumption of smooth-hound fillets is very extensive and consumers rank it second in preferences for fish, following hake fillets, and the price is the same as for hake (US\$2.47/kg in March 1998). Chilled and frozen steaks of mako, sandtiger shark and blue shark, which are usually sold as tuna or swordfish, are also consumed. The once rather prolific production of salted/dried products has declined considerably in recent years and only amounted to 20 tonnes in 1997. In 1997 Uruguay produced 890 tonnes of fresh and frozen sharks. In the same year exports were 1 330 tonnes, valued at US\$1.9 million. The bulk of these exports consisted of frozen sharks. Brazil takes most of the exports, with the remainder going to Germany, USA and Puerto Rico. In 1997 Uruguay has increased substantially its imports of elasmobranch, going from 137 tonnes, worth US\$90 000 in 1996 to 1 300 tonnes, valued at US\$ 1.5 million.

More information on this area can be found in the Latin American section in Appendix IV.5.

6.1.3.6 Oceania

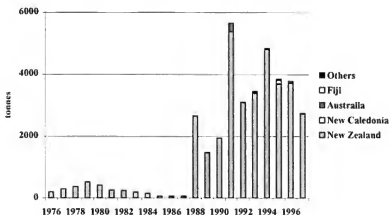
In 1997 the production of fresh and frozen sharks in the countries of Oceania was nearly 2 700 tonnes. In that year their exports amounted to over 2 700 tonnes, worth US\$6.2 million, while imports were 51 tonnes, valued at US\$107 000.

Figure 44 Oceania: chondrichthyan production of meat and fillets by country in tonnes, 1976-1997



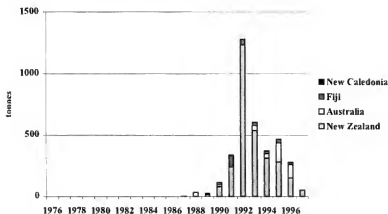
Source: FAO - FIDI.

Figure 45 Oceania: chondrichthyan exports of meat and fillets by country in tonnes, 1976-1997



Source: FAO - FIDI.

Figure 46 Oceania: chondrichthyan imports of meat and fillets by country in tonnes, 1976-1997



Source: FAO - FIDI.

Chondrichthyans have traditionally played an important role in the diet of coastal Aborigines and Torres Strait Islanders⁵⁰. The largest catch is off southern Australia, which primarily captures school sharks (*Galeorhinus galeus*) and gummy sharks (*Mustelus antarcticus*).

⁵⁰ LAST P.R., STEVENS J.D., "Sharks and rays of Australia", CSIRO, Australia, 1994

This latter is the main species consumed locally. Sharks are sold in fillet form and used in the fish and chip market. They are often marketed as flake. The meat of gulper sharks (*Centrophorus granulosus*), leafscale gulpers and of shortnose or picked spurdogs (*Squalus megalops*) is smoked, dried and salted for human consumption. Spotted wobbegong (*Orectolobus maculatus*) is appreciated for meat and other wobbegong species are sometimes sold³¹. Tope sharks are also marketed as whole frozen carcasses. Aborigines eat the blacktip reef shark as *buundhhaar*, in which the liver and meat are boiled separately and successively minced and mixed together. Imports of shark meat in Australia are limited and more than half comes from New Zealand.

New Zealand is the major producer and exporter of shark meat in Oceania. In 1997 it produced nearly 2 700 tonnes (1 500 tonnes of frozen sharks and 1 200 tonnes of fillets) and exported 2 730 tonnes worth US\$6.2 million (1 450 tonnes of frozen sharks, 1 200 tonnes of frozen shark fillets and the rest were fresh or chilled sharks). Exports are mainly directed towards Australia and various Asian countries such as Republic of Korea, Malaysia and Japan. New Zealand also exports limited volumes of shark meat to European countries such as Belgium (whole school shark and rig), Germany and Russia. Australia is the main market for school sharks and rig or spotted dogfish (*Mustelus lenticulatus*), Republic of Korea is the market for picked dogfish and Japan for ghost sharks. In 1997 New Zealand imported 51 tonnes, worth US\$105 000 of elasmobranchs. The great bulk of these imports consisted in fresh or frozen skates. Imports of sharks are limited and come from Australia, Malaysia, China and Taiwan Province of China. Rig, school sharks and picked dogfish are consumed by the domestic market. Sharks are usually used in the fish and chips trade and are often sold under market names such as pearl fillets for ghost sharks and lemonfish for rig³².

In the Solomon Islands shark meat is processed by filleting and then cutting into thin strips that are successively salted and sun dried or smoked. Sharks are usually eaten by small-scale artisanal fishers, generally made into soup³³. Shark is not eaten in many areas of Fiji because of traditional taboos on its use, but it is accepted in the Rotum and Rabi communities³⁴.

6.1.4 Prices

Table 19 lists prices for fresh and frozen shark by selected species and countries in the period January-April 1999

³¹ ROSE D., 1996, *idem*.

³² HAYES E. "New Zealand overview", chapter 3 of "The Oceania region's harvest, trade and management of sharks and other cartilaginous fish: an overview" in "The world trade in sharks: compendium of TRAFFIC's regional studies", volume II, TRAFFIC, 1996.

³³ MATTHEW P., "Solomon Islands, Western Province overview", chapter 4 of SANT G. HAYES E., "The Oceania Region's harvest, trade and management of sharks and other cartilaginous fish: an overview", in "The world trade in sharks: a compendium of TRAFFIC's regional studies", volume II, 1996.

³⁴ HAYES E., "Oceania overview", chapter 1 of "The Oceania region's harvest, trade and management of sharks and other cartilaginous fish: an overview" in "The world trade in sharks: compendium of TRAFFIC's regional studies", volume II, TRAFFIC, 1996.

Table 19 Indicative prices for shark meat in US\$/kg

| Species | Product form and grading | Grading | Price | Price reference and area | Origin |
|----------------------------|---------------------------------|-------------|---------------------------|---------------------------------------|---------------|
| Picked dogfish | Frozen, backs, skinless | 1-2 kg/pc | 9.91 | Italy, cif | UK |
| | Chilled | 1-2 kg/pc | 8.13 | | |
| | Frozen, back, skinless | 1-2 lb/pc | 1.76 | | |
| | | > 2 | 2.31 | | Denmark |
| | Frozen, backs | 1-2 lb/pc | 2.23 | France, cif | USA |
| | Frozen, back, skinless | < 400 gr/pc | 2.09 | | |
| | | 400-800 | 2.38 | | |
| | Frozen, back, skinless | > 800 gr/pc | 3.31 | UK, cif wholesale | UK |
| | Fresh, skinned | Medium | 7.45 | | |
| | | Large | 8.30 | | |
| Frozen, skinned | | 2.66 | | | |
| Frozen, belly flaps | < 6 pc/kg | 1.87 | Germany, cif | USA | |
| | 6-10 | 2.53 | | | |
| | > 10 | 3.09 | | | |
| Fresh | | 0.94 | New York (USA), wholesale | | |
| Blue | Frozen, headed and gutted | 10-40 kg/pc | 1.60 | Germany, c&f | Morocco |
| | Frozen, headed & gutted | 10-30 kg/pc | 1.00 | | Peru |
| Mako | Frozen, headed & gutted | 10-30 kg/pc | 2.60 | | |
| | Frozen | | 1.37 | Playa, Guayaquil, wholesale | Ecuador |
| | Frozen | | 3.62 | Miami (USA), c&f | |
| Tope | Fresh | 1 kg/pc | 0.58 | Spain, cif | Spain |
| | Frozen, whole | Medium | 0.93 | São Paulo (Brazil), wholesale | Brazil |
| | Large | 1.38 | | | |
| Narrownose smooth-hound | Frozen, whole | | 0.77 | | |
| Angel | Frozen, whole | Large | 1.38 | | |
| | Frozen, whole | Medium | 2.16 | Rio de Janeiro (Brazil), wholesale | |
| | | Large | 1.20 | | |
| Thresher | Fresh, head & gutt. (air-flown) | | 2.18 | Miami (USA), c&f | Costa Rica |
| | Frozen, loin skin-on | | 3.26 | | |
| | Frozen, loin skin-off | | 3.35 | | |
| | Frozen, headed & gutted | | 2.58 | | Ecuador |
| | Frozen, headed & gutted | | 0.49 | Playa, Guayaquil, wholesale | |
| | Fresh | | 1.38 | New York (USA), wholesale | USA |
| Blacktip | Fresh, whole | | 1.84 | | |
| Shark nel | Fresh, whole, fresh | | 0.66 | Abidjan (Côte d'Ivoire), auction | Côte d'Ivoire |
| | Frozen, headed & gutted | | 1.30 | Europe, c&f | Peru |

Source: INFOFISH Trade News; INFOPECHE Noticias Comerciales; INFOPECA Noticias Comerciales; GLOBEFISH European Fish Price Report; NY Fulton Fish Market, Rungis, Billingsgate

6.1.5 Processing and preparation

The meat cannot be properly preserved unless adequate handling practices have been applied from the time the shark is caught. Sharks have urea and trimethylamine in their blood and tissues, substances that help sharks to maintain their osmotic balance. Urea must be removed by bleeding the shark immediately after capture. If this is not promptly done, the urea will degrade into ammonia which will contaminate the shark's flesh. Urea is a non-toxic by-product of protein

metabolism which is formed in the blood and body fluid of all marine fish both bony and cartilaginous. The only difference is that the bony fish excrete urea quickly while sharks retain it in their blood. As a result the blood has a higher osmotic concentration than that of the bony fish and absorbs fresh water through membranes by osmosis⁵⁵. The intensity of urea varies by age and species. According to Gordievskaya⁵⁶, sharks have various urea concentrations which are species-characteristic. Picked dogfish is said to have the lowest urea content (1 570 mg%), while hammerheads have the highest (2 330 mg%). Urea is not dangerous but it gives the meat a particular smell and a somewhat bitter and acid taste. This affects either the choice of species for human consumption or the processing techniques. With the difference in the urea concentration, the intensity of the smell and taste differs between species. Accordingly, some species need a more thorough treatment than others, in order to reduce the urea content.

The first step for proper handling is bleeding the sharks immediately after they are caught. Sharks have to be brought in live or not left too long in the water after death. The second step frequently is washing and soaking the meat in fresh water, salt brine or an acid solution for a greater elimination of urea and its breakdown products. The urea content can also be reduced by heat treatment (blanching, baking, sterilization), and by pickling. According to Gordievskaya⁵⁷, if shark meat is pickle-cured and subsequently soaked, 79-90% of its urea content is removed. Very fresh meat of species like picked dogfish that contain the lowest level of urea content, does not require soaking, while that of species like hammerheads have to be soaked in brine for several hours. Thirdly, the sharks have to be iced or frozen to delay and prevent bacteriological growth. They have to be protected against the rays of the sun and to be kept cold, below 1°C interior temperature. According to Kreuzer and Ahmed⁵⁸, species such as picked dogfish are not bled in the North American fisheries but, immediately after capture, put on ice or frozen. They are often landed as whole carcasses with the skin intact. Fresh and frozen shark meat is usually prepared as whole carcasses (headed and gutted), split carcasses, fillets and blocks for storage and shipment.

Small species are usually preferred for meat as they usually have lower concentration of urea and mercury in their flesh and are also easier to process. Sharks have no rib case, in contrast to bony fish. The muscles are attached directly to the skin. This, and the robust fibrous structure of the skin, are the causes of the hard work involved in skinning big sharks. Furthermore, the scales of the sharks are small placoid plates called dermal denticles. These natural features cause delay in processing large sharks and these delays have to be taken into consideration when planning the utilization of the meat of skinned large sharks for human consumption⁵⁹.

Where there are no available facilities for immediate refrigeration or freezing or when there is a surplus of shark meat which cannot be sold fresh, sharks are more commonly filleted and then salted and dried, or smoked. The fillet form is preferred in order to minimize the time for salting and drying the shark meat. Fillets are often sun-dried. Dried and salted shark meat is widely consumed in eastern and southern Africa, and in the Caribbean. In Germany belly flaps are smoked and prepared as *Schillerlocken*, a gourmet speciality which is relatively expensive.

⁵⁵ KREUZER R., AHMED R., *idem*.

⁵⁶ GORDIEVSKAYA V.S., "Shark flesh in the food industry", Israel program for scientific transl., IPST cat. No. 60080 2., 1973.

⁵⁷ GORDIEVSKAYA V.S., *idem*.

⁵⁸ KREUZER R., AHMED R., *idem*.

⁵⁹ KREUZER R., AHMED R., *idem*.

Shark meat is used for the production of minced fish products such as fish balls, fish cakes, fish sausage, tempura, surimi, fish ham and fish paste which are particularly appreciated in East Asia

Smaller shark species are also, but quite rarely, sold live.

6.1.6 Composition and nutritional value

Shark meat represents a valuable source of protein, which varies according to the species as can be seen in Table 20

Table 20 Chemical composition of shark meat

| Species | Moisture | Protein | Fat | Mineral substances |
|--------------|----------|---------|-----|--------------------|
| Horn | 79.6 | 17.7 | 0.3 | 1.8 |
| Copper | 75.8 | 18.9 | 0.1 | 0.6 |
| White tipped | 76.9 | 19.9 | 0.3 | 1.3 |
| Hammerhead | 75.6 | 21.6 | 0.2 | 1.6 |
| Silky | 73.6 | 21.7 | - | 1.2 |
| Tiger | 79.4 | 16.3 | 0.1 | 0.6 |

Source: Gordievskaya, Shark flesh in the food industry, 1971

6.2 FINS

Shark fins are one of the most expensive fish products in the world. They are used to prepare shark fin soup and have a traditional and virtually exclusive market among Chinese ethnic groups established in different parts of the world, but little elsewhere. Thus, domestic sales in primary producing countries, such as India, Indonesia, Japan and the USA, are negligible. Their production is almost totally exported to major markets, especially Hong Kong and Singapore, where shark fins fetch very good prices.

The use of shark fins as food has been known in China for centuries. It was reported in writings of the Ming Dynasty (1368-1644). The quest to locate exotic and health promoting food by emperors and noblemen was met by the use of shark fins. As only a small quantity can be obtained from a large fish, fins were noble and precious, fit for the tables of emperors. Throughout the ages the Chinese have considered shark fin one of the eight treasured foods from the sea. By the Qing Dynasty (1644-1911) shark fins had become a traditional part of formal banquets. Today fins are still served at dinner parties to express the host's respect for his guests, usually at weddings and other important functions. October-February is the period of highest consumption as it is the customary season for weddings and other parties, with a peak during the parties for Chinese New Year. Business in July and August is slack as these two months are considered inauspicious by the Chinese⁶⁰.

⁶⁰ KREUZER R., AHMED R., *idem*.

The benefits of shark fin as documented by old Chinese medical books include rejuvenation, appetite enhancement, nourishing to blood, beneficial to vital energy, kidneys, lungs, bones and many other parts of the body. The chemical composition per 100 grams of dried shark fin needles is as follows:

Table 21 Chemical composition of dried shark fins

| | |
|--------------|----------|
| Water | 14.0 g |
| Protein* | 83.5 g |
| Fat | 0.3 g |
| Carbohydrate | 0.0 g |
| Ash | 2.2 g |
| Calcium | 146.0 mg |
| Phosphorus | 194.0 mg |
| Iron | 15.2 mg |
| Food energy | 337 kcal |

*The protein of shark fin is deficient in the essential amino acid Tryptophan.

Source: Food composition tables, People's health publication, Beijing

6.2.1 Characteristics⁶¹

Most species of sharks have at least two sets of median fins situated along the central line of the body. There are one or two dorsal fins on the top, a caudal fin, which is the tail, and an anal fin located at the underside behind the anus. Most sharks have triangular dorsal fins. There are usually two, the first being generally larger than the second, but in some species there is only one. The caudal fin is asymmetrical with the vertebral column extending into the upper lobe. The anal fin is not present in all species. Its absence or presence is important in shark classification. They also have two sets of paired fins on the underside of the body. These are the pectoral fins just behind and, in some cases, partly below the gill slits and the pelvic fins located at about the midpoint of the underside of the body. As with all the fins in sharks, the pectoral fins cannot be folded back and are consequently erect all the time.

A shark fin has very little muscle tissue. There is a membrane, and in some cases a fatty layer under the skin, covering a bundle of collagen fibres spread out like a fan. In most fins these fibres are supported by a cartilaginous platelet in the centre. The cartilaginous platelet is absent in the caudal fin.

Sharks do not have scales. The skin of the fins, like that of the rest of the shark's body, is covered with large numbers of usually very small thorn-like structures or denticles. These make shark skin feel like sandpaper.

The collagen fibres of the fin are rounded at the base, tapering to fine points at their extremities, giving the appearance of needles. These soft/collagen elastin fibres are commonly known as fin needles. Separately or joined as a bundle, the fin needles are used in soup making

⁶¹Part of this section is taken from CHEN S.P., "Shark products markets in Singapore and Malaysia", Appendix IV.2 of this report.

and other traditional Chinese dishes. Shark fin soup is usually prepared by adding other ingredients for taste, such as chicken, crab or abalone.

Fins are the most valuable part of the shark and are easily one of the most costly food items in the world. The preparation of shark fins does not require any elaborate treatment but the greatest care must be taken in their removal and processing as fins that are not properly dried or trimmed cannot be accepted as first grade fins and their value is reduced. Lovers of shark fin soup are meticulous about the appearance and quality of the cured product so the buyers are extremely quality-conscious. Certain countries, such as Japan, Australia, Spain, Mexico and others in the Americas, are considered able to produce better quality shark fins. They are usually those with a developed fishery having adequate infrastructure and post harvest technology. This enables the fins to be kept fresh, clean and unsalted before drying. The countries around the Indian Ocean are more traditional in their shark fin processing methods and lack infrastructure. Fishermen and processors in these countries are more inclined to use salt for preservation. This results in an inferior product with high moisture content. These countries are also resistant to change with a philosophy that as long as the products sell there is no reason to change. An exception in this group, according to an importer, is Sri Lanka, which adheres to tradition yet is able to produce a good product⁶².

6.2.2 Products

Shark fins are processed and marketed in many forms. The following are the most important⁶³:

- **Wet fins** fresh, chilled and unprocessed.
- **Raw fins** in dried form only, complete with denticles and cartilaginous platelets. The colour varies with species but are generally grey black, light brown or yellowish. The denticles on the skin make the surface rough to the touch.
- **Semi prepared** with the skin removed but fibres still intact as one dry mass. According to Kreuzer and Ahmed⁶⁴, this is the most expensive form, as it is the cleanest and purest presentation. Tails can be prepared in this manner in one piece but pectoral and dorsal fins have to be split into two. Value, of course, is governed by yield after processing.
- **Fully prepared** with individual strands of the cartilaginous platelets showing separately. These are packed in cardboard boxes or simply in a single or double layer of viscose film.
- **Frozen prepared fins**
- **In brine**
- **As fin nets** The cartilaginous fin needles have been boiled, separated, redried and packaged in loose groupings

⁶²CHEN S.P., *idem*.

⁶³From KREUZER R., AHMED R., *idem* and LAI KA-KEONG E., "Shark fins, processing and marketing in Hong Kong", INFOFISH marketing digest, 5/83, 1983.

⁶⁴KREUZER R., AHMED R., *idem*.

- **Prepared ready to eat or cook products** Canned soups, prepared dishes in cans or pouches and instant soup powders

Fins are usually imported in the dried form, complete with denticles and cartilaginous platelets and are further processed by traders to produce the various processed forms.

6.2.3 Grading

Shark fins are mainly graded by type, size, as black or white and other factors such as moisture content, smell and the cut.

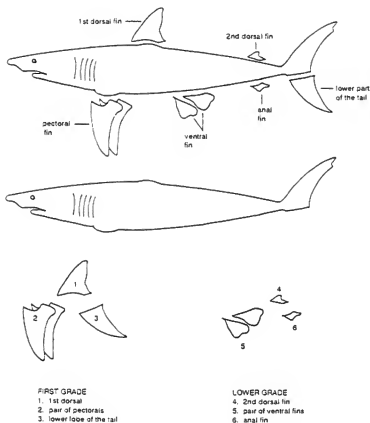
The size of a fin is measured either on the length of the base of the fin or the distance between the centre of the base and the tip of the fin. Depending on the size, fins are graded as extra large (40 cm and above), large (30-40 cm), medium (20-30 cm), small (10-20 cm), very small (4-10 cm) and mixed or assorted. This last grade also includes ventral and anal fins.

The typical classification is in white and black groups. Some traders say that this is a description of the colour of the fins (black: e.g. *Carcharhinus* species, mako and blue sharks; white: e.g. sandbar and hammerheads), others that it is a classification by their yield and taste and a third version maintains that shark fins of the white group belong to sharks from shallow waters while the black belong to sharks from deeper waters. The former have a set of three fins, two dorsal and a caudal fin, whereas the latter have a set of four, a pair of pectorals, a dorsal and a caudal fin. All agreed however that fins of the white group give higher percentage of fin needles and a better flavour. These are more sought after and thus command higher prices. Fins from the black group are inferior in both percentage yield and flavour. This classification is typically used but there are also differences in opinion. For instance, the fins of tiger sharks are considered to be white by one Indian authority and black by another.

Shark fins can also be graded according to species. Even if it is rather difficult to identify the species from dried fins, with a few exceptions, larger traders of shark fin know exactly what they are dealing with. They can tell by looking at a raw fin its position on the shark, its trade name and its country of origin. The identification of species from fin needles is extremely difficult except, perhaps, for some large fin needles.

The quality and quantity of fin needles within a shark varies widely. Thus, not all fins of a shark are of the same commercial value. The most valuable are the first dorsal fin, the pair of pectoral fins and the lower part of the tail, as can be seen in the following figure.

Figure 47 Relative commercial value of shark fins



Source: SUBASINGHE S., "Shark fin, sea cucumber and jelly fish. A processor's guide", INFOFISH Technical Handbook 6

Traditionally shark fins are traded as fin sets and preference is for complete sets from the same shark than for an assorted mixture. According to Kreuzer and Ahmed⁶⁵, the complete set consists of two pectoral fins, the first (rarely the second) dorsal fin and the lower lobe of the caudal (tail) fin. The proportion of fins by quantity should normally be of around 50% for pectoral fins, 25% for dorsal fins and 25% for caudal fins.

⁶⁵ KREUZER R, AHMED R., *idem*.

Fins from sharks under 5 feet in length and the very small anal, ventral and second dorsal fins have a low commercial value and are sold as mixed fins or fin nets after processing. The upper lobe of the tail of all sharks has also very little commercial value.

According to Chen⁶⁶, importers purchase shark fin in various different ways, depending very much on how the suppliers sort the fins. Some sort the fins into three categories as follows:

- First grade fins, i.e. the white fins, in sets of three, which consist of two dorsal fins and a caudal fin. The sets are of the same species and the same sizes are packed together. The size in this case is determined by the length of the first dorsal fin.
- Second grade fins, i.e. the black fins, graded by species and size. If sold in sets, the size referred to would be that of the pectoral fin.
- Second grade bottom fins; anal and pelvic fins of mixed species and sizes.

Others sell in 1-2 tonne lots, mixing species and sizes. Using this method, importers report losses of 2-3kg of choice fins of choice species per lot.

6.2.4 Preferred species

According to Kreuzer and Ahmed⁶⁷, fins from all sharks of over 1.5m in length are commercially valuable, except the fins from the nurse shark (*Ginglymostoma cirratum*) and the pectoral fins of the saw shark (*Pristiporus nudipinnis*). Even if there are species whose fins are generally considered excellent, preferences for fins of particular species can change from one country or one person to another. The fins of the same species can be highly appreciated by some people and refused by others. There are fins which are popular due to their high percentage yield of fin needles and their needle size, texture and appearance. The fins from some other species, such as blue shark, are popular because they are readily available at comparatively low prices even if they are not considered of high quality. The preferred species for fins in major markets are shown below but this scheme must not be considered as a static worldwide reality but only a tendency.

FIRST CHOICE

Blue shark
Dusky shark
Giant guitarfish
Hammerhead
Mako shark
Oceanic whitetip shark
Sandbar shark

SECOND CHOICE

Blacktip reef shark
Blacktip shark
Great white shark
Lemon shark
Requiem sharks
Smalltooth sandtiger shark

⁶⁶ CHEN S.P., idem.

⁶⁷ KREUZER R., AHMED R., idem.

Spadenose shark
Thresher shark
Tiger shark
Tope shark
Scalloped hammerhead

THIRD CHOICE

Basking shark
Picked dogfish
Whale shark

6.2.5 Pricing

The commercial value of the fin depends on various factors, the principal ones being⁶⁸:

- ◆ **the percentage yield of fin rays or fin needles.** From an economic standpoint, the fin with a higher percentage of fin needles offers a better value for money, and therefore is preferred. The yield in turn is governed by a number of factors:
 - The type of fin, e.g. the lower lobe of the caudal fin has no cartilaginous platelet, therefore, compared to other types of fins, this has the highest percentage yield of fin needles. The upper lobe of most species does not yield fin needles so, after removal of the denticles, the skin is dried and sold as fish lips. The variations in sizes of fin needles are vast. Generally, the larger the fin, the longer and thicker are the fin needles. The caudal fin by comparison is the largest fin of the fish, therefore yields the thickest and longest fin needles, followed by the first dorsal fin and then the pair of pectoral fins. The fin needles from the second dorsal fin, the pair of ventral fins and anal fin are considered to be of much lower quality.
 - The species, e.g. the whole caudal fin of the shovel Nose Ray yields fin needles from both the lower and upper lobe. The fin needles of Basking shark are reputed to be as thick as a chopstick while fin needles from some fins are finer than hair.
 - The processing methods employed, e.g. whether the fin is clean cut or has shark meat attached, whether it is light and dry or been salted and thus has a high moisture content. The trade in general is weary of ageing fins. In such cases, certain parts of the fin lose their natural elastic property and acquire a hard bony structure, which is not palatable. Unfortunately, ageing in the fin is not easily detected when dry, i.e. at time of purchase. When the ageing becomes visible after rehydration it has to be discarded. It is reported that this phenomenon is more common in species inhabiting tropical waters, as the environment makes the sharks age faster⁶⁹.
- ◆ **The general appearance:** a good fin product would be clean cut, with no meat or other undesirable attachments at the cut edge. The surface of the washed fins should be a whitish yellow. Generally, when the fin needles are connected in a bundle and/or are

⁶⁸The author of this section is CHEN S.P, idem.

⁶⁹ YANG, LIN and ZHOU (1997) *The complete Book of Dried Seafood & Foodstuffs* (Chinese Edition). Hong Kong, China

long and thick, they would present a greater visual and sensual impact to the diner, thus commanding a higher price than the shorter and finer ones.

- ♦ **The texture:** the connoisseur often demands a specific fin for its texture, usually tenderness. In such cases this criteria takes precedent over length or thickness. The very thick fin needles from very large fins have a tendency to be tough.

Worldwide, prices of shark fins increased remarkably in the late 1980s and 1990s, reflecting the substantial growth in demand. This increase is linked to the opening of the Chinese market together with the reduction of tariffs and the relaxing of political pressure which discouraged the consumption of this product in the past when it was considered too luxurious for domestic consumption.

Table 22 lists prices for shark fins by selected species, product forms and countries in the period January-April 1999.

Table 22 Shark fin prices in US\$/kg, Asia

| Product form and grading | Price | Price reference and area | Origin |
|--|-------|--------------------------|---------------|
| Black shark fins, DVP | | Singapore, c&f | India |
| 30-40 cm | 45.00 | | |
| 20-30 cm | 32.50 | | |
| 10-20 cm | 27.00 | | |
| Black, shark fins, and tails, 10-20 cm | 30.00 | | |
| Black shark fins, tube | | | |
| 30 cm | 80.00 | | |
| 20-30 cm | 47.00 | | |
| 10-20 cm | 30.70 | | |
| Black tails | | | |
| 20 cm and up | 42.00 | | |
| 10-20 cm | 35.00 | | |
| Tiger shark fins, tails, 20 cm and up | 18.00 | | |
| White shark fins and tails | 37.00 | | |
| White heera shark fins/tails | | | |
| 20-30 cm | 23.00 | | |
| 50 cm up | 13.00 | | |
| Yellow shark fin, rays, 20 cm up | 43.00 | | |
| Shark fin rays, DVP | | | |
| 10-20 cm | 45.00 | | |
| Below 10 cm | 35.00 | | |
| Shark fin rays, mixed | 30.00 | | |
| Shark fins, tails (processed), 4.5 inch up | 80.00 | | |
| White shark fins, straight cut in full set | 55.00 | | |
| Blue shark fins, dorsal, pectoral, tails | 30.00 | | |
| Black shark fins, DVP | | | China |
| 30 inch and up | 45.00 | | |
| 20-30 inch | 32.50 | | |
| 10-20 inch | 27.00 | | |
| White shark fins, dorsal/pectoral, tails | 86.00 | | Australia |
| Black shark fins, dorsal, pectoral, tails | 45.00 | | South Pacific |

Table 22 Shark fin prices in US\$/kg, Asia (continued)

| Product form and grading | Price | Price reference and area | Origin |
|---|-------|------------------------------|--------|
| Ocean white, half moon cut in full set | 42.00 | Singapore, Wholesale | |
| Blue shark fins, half moon cut in full set | 35.00 | | |
| Mako shark, half moon cut in full set | 16.00 | | |
| Black shark fins, tails | | Hong Kong, c&f | India |
| 20-30 cm | 65.00 | | |
| 10-20 cm | 30.00 | | |
| Black shark fins, DVP | | | |
| 40 cm above | 48.00 | | |
| 30-40 cm | 45.00 | | |
| 20-30 cm | 32.00 | | |
| 10-20 cm | 18.00 | | |
| White shark fins and tails | 40.00 | | |
| White shark fins, pulli, 30 cm and up | 51.00 | | |
| White heera shark fins, tails | | | |
| 20 cm/up | 19.00 | | |
| 10-20 cm | 10.00 | | |
| White shark fins, DVP & tails, 20 cm and up | 64.00 | | |
| Tiger, shark fins/tails, 20 cm/up | 18.00 | | |
| Yellow shark fins/tails | 84.00 | | |
| Queen shark fins | | | |
| 20 cm/up | 14.00 | | |
| 10-20 cm | 11.00 | | |
| Shark fin rays, mixed | 25.00 | | |
| Queen shark fins/tails | | Far East/Southeast Asia, c&f | |
| 20 cm up | 14.00 | | |
| 10-20 cm | 11.00 | | |
| Yellow shark fins, 20-30 inch | 22.00 | | |
| White vichide and tail 20 cm and up | 65.00 | | |
| Shark fins, tails | | | |
| 10-20 cm | 55.00 | | |
| Below 10 cm | 43.00 | | |

Source: INFOFISH Trade News.

6.2.6 Processing⁷⁰

6.2.6.1 Fresh Fins

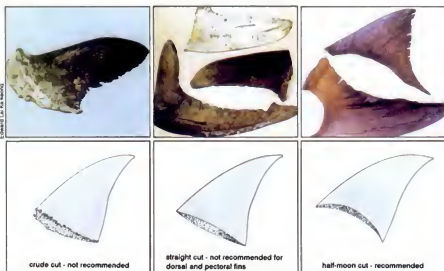
The fins should be severed from the body as soon as the fish is caught. Fins from sharks over 4-5 feet in length are used for processing. Care should be taken to minimise the amount of meat left on the fin by cutting off the fin just where the strands of fin rays start. The dorsal and pectoral fins of sharks are relatively thick at their base and have muscle tissue extending a short distance into the base of the fins. In this respect special care should be taken with the first dorsal fin which has more meat at its base. The "half-moon cut" (Fig. 2) preferred by the processors retains very little meat thus giving a more desirable end product. The "straight cut" and the

⁷⁰ The author of the following section is SUBASINGHE S., "Shark fin, sea cucumber and jelly fish. A processor's guide", INFOFISH Technical Handbook 6, 1992.

irregular "crude cut" leave varying amounts of meat on the fin. If fins are not properly severed, the residual meat often imparts a bad odour and colour to the fins thus lowering product quality.

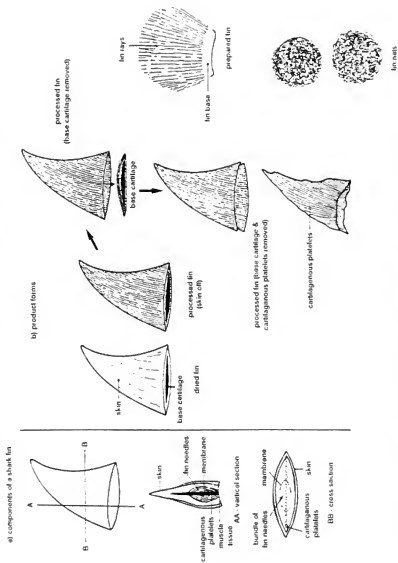
Freshly cut fins have to be cleaned well by scrubbing away any dirt or adhering extraneous matter and washing them well in fresh water or in sea water. If fins are to be traded in the fresh or wet form, cleaned fins may be stored in ice for several days with re-icing if necessary. Fins keep longer if frozen.

Figure 48 Methods of cutting fins



Source: SUBASINGHE S., "Shark fin, sea cucumber and jelly fish. A processor's guide", INFOFISH technical handbook 6, 1992.

Figure 49 Components of a shark fin and appearance of various product forms



Source: SUBANINGHE S., "Shark fin, sea cucumber and jelly fish: A processor's guide", INFOPISH Technical Handbook 6

6.2.6.2 Dried Fins

The cleaned fresh fins may be sun dried on mats, trays or racks or hung from a line. Some recommend the dusting of salt on the fins, especially on the cut ends. If salt has been used on cut surfaces the excess salt on the surface has to be washed away prior to sun drying. The sun-drying process may be started on board if fishing operations are long.

When fins are sun-dried on trays or mats, they should be turned periodically to facilitate drying and to prevent scorching and curling. Fins should be kept out of the rain. They should be taken indoors at night to protect from insects and vermin and to prevent the deposition of dew. Throughout the drying process care should be taken to avoid the contamination of fins with sand and other extraneous matter. Depending on the thickness of the fin, it takes 7-14 days of sun drying to get a satisfactorily dried product with a moisture content of around 10-15%. According to codex standards, the moisture content of the final product should not exceed 18%. The properly dried fins make a characteristic sound when tapped against each other. If sun drying is not possible, a mechanical dryer set at 40°-50°C may be used. However, traders prefer sun-dried to oven-dried fins.

Common defects in dried shark fins are:

- **Blemishes** Caused by bad handling and delay in removing the fins
- **Defective cuts** Excess residual flesh on the fins or crude cuts
- **Burns** Deep, hard furrows caused by prolonged exposure to the sun or improper mechanical drying
- **Curling** Exposure of fins to uneven, non-uniform drying
- **Insects** Attack of the dried fin with mites

Packaging and storage: The product is packed as per the requirements of the buyer, either in cartons, wooden cases or gunny sacks. The last form of packaging is preferred as it allows the product to “breathe”. Airtight containers tend to develop a high humidity within the container, resulting in possible deterioration in quality. Generally, larger, more valuable grades are packed in 25kg bags. The mixed or lower grades are shipped in 50kg sacks.

6.2.6.3 Processed Fins

Softening: The initial stage of processing constitutes softening the fins using water. Fins are soaked for 8-10 hours. Frozen fins have to be properly thawed prior to soaking. Sun-dried fins have to be soaked for a longer period, up to 16-24 hours. After the initial soaking period the fins are further soaked, in water pre-heated to 80°-90°C, until the scales and the skin are loose or soft. The fins should not be cooked nor the water bath heated with fins inside, as this could damage the texture of the fin rays.

Descaling, skinning and removal of meat: The softened fins are transferred into a bucket of chilled water and the scales and skin are carefully removed using a wire brush. The fins are

washed again in fresh water. The meat attached to the fin and the cartilaginous base plate is removed carefully and the fins washed well in running water.

Drying: Processed fins are dried in the sun on bamboo mats for 4-6 days, occasionally turning them to facilitate uniform drying and prevent curling. Excessive heat could lead to scorching and browning of the product. Alternatively, a mechanical dryer may be used for the purpose.

The processed fins at this stage retain the original shape of the fin. Processors remove varying amounts of base cartilage and cartilaginous tissue between the two layers of fin rays from the larger, more commercially valuable fins. The two layers of fin rays may also be completely separated into two bundles prior to sun drying.

6.2.6.4 Fin Needles

Processed fins may be further processed to fin needles or fin nets. Initially the processed fins are softened by soaking in water up to 12 hours. The fins are then boiled in water for a very short time, about five to ten minutes, to facilitate the removal of bundles of needles which now stand prominently as a result of expansion due to absorption of water. Boiling also facilitates the removal of the membranous sheath covering the bundles of needles. At this stage fins are transferred to chilled water and the base of fin strands kneaded and softened by hand to separate fin needles from the membrane. Any remaining membrane tissue is removed from the fin needles. The fin needles may be removed in the wet form as wet fin needles or may be further processed to fin nets.

6.2.6.5 Fin Nets

Small fins, lower grade fins and fin assortments are normally processed into fin nets. The washed wet fin needles are arranged into fin nets of around 100 gm each and sun dried. Some traditional processors bleach the wet fin nets prior to sun-drying. The fin nets are bleached for about 20 minutes in a special chamber, where sulphur is burned beneath the trays carrying wet fin nets. The bleached fin nets are then sun-dried. This treatment also helps to protect the product from insect attack.

6.2.7 Artificial shark fin⁷¹

This is a product with the appearance and, to some extent, the texture of shark fin that has been produced from animal and plant materials. Because of its looks and its comparatively very low price, some restaurants use it instead of shark fin with or without the knowledge of the consumer. To make the dishes more authentic, the restaurants usually mix artificial fins in with shark fin in a 30/70 ratio. It is probably most used at wedding dinners, where the respect for the dinner guests is upheld with the presence of fins, and the respect for the host's finances is taken care of by lower costs.

⁷¹ This section is mainly based on the Appendix IV.2, "Shark products markets in Singapore and Malaysia", of this report (author CHEN S.P.) and Appendix IV.1, "Hong Kong", (author HOOI K.K.).

A trained person can easily tell the difference between the artificial fins and the shark fin. Generally, the artificial fins are less elastic, break more easily and do not withstand heat as well as the real thing. It is not so easy for the untrained to know the difference, especially since most diners' experience of shark fin is rather limited. The price of artificial fins is US\$10/kg.

According to Hooi, they have been used somewhat fraudulently, and have not established themselves as an alternative in the way that imitation crab sticks have for real crab. Perhaps manufacturers should re-think their marketing strategy since traders in Hong Kong believe imitations are as good as rejected. This is rather surprising since Chinese vegetarians like to prepare their food to imitate meat products in both appearance and taste, such as vegetarian duck, vegetarian pork and so on.

Marketing in Singapore is straightforward and the imitation articles can be sold as such but there must be no attempt to deceive the consumer by slick advertising or labelling. The vegetarian shark fin is made from the extract of mung bean, the green gram, which is a widely cultivated tropical legume. In fact, mung bean extract is traditionally made into a transparent thin noodle that is eaten quite widely in Southeast Asia, and in Hong Kong is called *fun si*. Liu (1997) said that imitation vegetarian shark fin is quite popular in Taiwan Province of China.

Chew and co-workers (1992) in Singapore, investigated what they believed to be imitation shark fin of animal origin. They referred to the process for producing analogues using mixtures of gelatines and gums which were coagulated by divalent or trivalent metal salt solutions which was patented by Kammuri, Nagahisa and Kamikawa (1990). They subjected samples to microscopic examination, solubility in water and potassium hydroxide (KOH) solution, spectroscopy and hydroxyproline content. They found that imitation fins do not have any fibrous structure like the real fin needles, but instead have characteristic transparent homogenous appearance. Real fins under x40 magnification show connective tissue fibres uniformly arranged in parallel and aligned with the lengthways axis of the fin needles.

Both real and imitation fins are insoluble in water. Boiling at 100°C for 3 hours and autoclaving at 10 psi/115°C for 30 minutes did not change their microscopic appearances.

When they were soaked in 10% KOH at 25°C for 3 hrs, the genuine fin needles disintegrated and dissolved. The membranous attachments to the needles took a little more time to dissolve, and occasionally cloudy precipitates formed on standing, but they quickly dispersed on gentle shaking. The five imitation products they examined remained intact even after 30 days in KOH at room temperature. Changes observed were slight swelling of the needles, a softening of texture, and a loss of yellow coloration into the solution. Under the microscope the needles showed numerous vacuoles consistent with swelling.

The extracts from soaking in 10% KOH for 3 hrs at 25°C showed different spectrophotometric profiles. Real shark fin showed 3 peaks at 292nm, 240nm and one between 220-230nm. The solution from the imitation fins soaked for 3 hours in 10% KOH showed only a single peak at 220-230nm. The blank 10% KOH solution also had an absorption peak at between 220-230nm. Boiling the real and imitation needles resulted in dissolution of the former and four out of five of the latter. Nevertheless, their absorption spectra remained unchanged. The authors believed that the absorption mixture at 240 and 292 coincided with that of tyrosine in alkaline conditions; shark fin contains a high proportion of this amino acid.

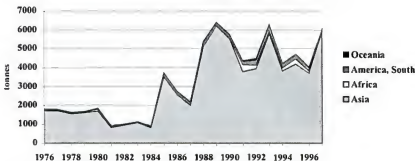
They also found that hydroxyproline was not a suitable test for imitation shark fin because the test itself was time-consuming and manufacturers could easily switch to a gelatine derived from fish to mask the fact that the product was an imitation.

Authentication tests are still provided by the Singapore authorities but the laboratory has not been engaged to provide this service for several years. This is because imitation fins appear to be pitted against a haloed article. Besides, armed with a simple chemistry set and microscope, a schoolchild can tell the difference between the fins.

6.2.8 Trade and markets

Shark fins have been eaten as Chinese delicacy for more than two millennia and world trade in these products has occurred for centuries. The economic and political changes in the Chinese market and the reduction in Chinese tariffs on shark fins in the mid 1980s led to a sharp increase in consumption, prices and trade in shark fins during the late 1980s and 1990s. This trade increase is only partially reported in FAO statistics, which indicates incomplete reporting by countries of their trade and production in these products. According to FAO statistics, world production of shark fins has increased from 1 800 tonnes in 1976 to 6 030 tonnes in 1997, peaking at 6 400 tonnes in 1989. In 1997 production of dried, unsalted shark fins was of 2 900 tonnes and that of dried, salted, etc. shark fins of nearly 3 100 tonnes. In 1997 China was by far the major producer with 2 200 tonnes, followed by India and Indonesia. Until 1994 India was the leading producer country.

Figure 50 World production of shark fins by continent in tonnes, 1976-1997

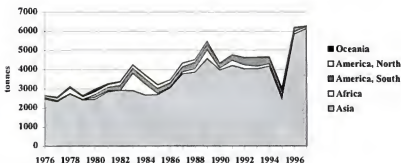


Source: FAO-FIDI.

World exports of shark fins have grown from 2 670 tonnes worth US\$13.0 million in 1976 to 6 300 tonnes (US\$90.4 million) in 1997, the peak year in volume. Re-exports in this year amounted to about 2 000 tonnes (US\$20.0 million) with Hong Kong as the main reporting country. The 1997 exports consisted of 1 100 tonnes (US\$25.0) of dried, unsalted shark fins and 5 200 tonnes (US\$65.4 million) of dried, salted, etc. shark fins. In 1997 China was the leading exporter of shark fins with more than 2 400 tonnes (US\$32.7 million), followed by Hong Kong (where 99.9% were re-exports), Indonesia and Japan. In 1994 Singapore was the second largest exporter of shark fins with about 1 000 tonnes but in the following three years there were no

reports of these exports to FAO. In 1995 a sharp decline was experienced in total exports, as China did not report its exports and imports of shark fins to FAO that year. In 1997 Asian countries accounted for 98.1% of the total volume of exports. Central and Latin America contributed 0.3% and 1.6% came from Africa.

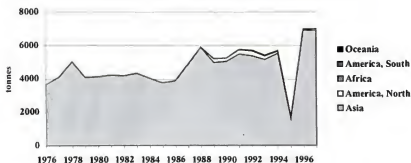
Figure 51 World exports of shark fins by continent in tonnes, 1976-1997



Source: FAO – FIDI.

FAO data shows an increase in world imports of shark fins from 3 700 tonnes worth US\$20.0 million in 1976 to 7 025 tonnes worth US\$55.5 million in 1997, the highest volume reached to date. China is also the major importer of shark fins with about 4 400 tonnes (US\$24.8 million) in 1997, followed by Hong Kong, Malaysia and Indonesia. In 1994 Singapore was the second largest importer of shark fins with 1 200 tonnes but it has not reported its shark fin imports for the following three years. The consistent decline in 1995 shown in figure 52 is linked to China not reporting its shark fin imports to FAO, as also seen for exports. Asian countries imported 98.6% of world imports in 1997.

Figure 52 World imports of shark fins by continent in tonnes, 1976-1997



Source: FAO – FIDI.

6.2.8.1 Africa

According to FAO statistics, African production of shark fins is rather limited, amounting to 122 tonnes in 1997, with a peak of 360 tonnes in 1991. In 1997 South Africa was the major producer with nearly 80 tonnes but until 1995 Senegal was the leading country. In 1997 South Africa exported all the production reported to FAO and was also the leading African exporter of shark fins in volume terms. Other countries reporting exports of shark fins in this year were Senegal, Ghana, Madagascar and Tanzania. Senegal was the major exporter in value terms with US\$2.2 million, followed by South Africa and Madagascar. In 1983 and 1984 Tanzania reported high quantities of exports with, respectively, 868 tonnes and 544 tonnes. Limited volumes of imports are reported by South Africa (18 tonnes, US\$ 21 000).

In Africa very often the fishermen use only the fins and discard the meat because of marketing problems. Fins are favoured by the fishermen as they can obtain a good price due to foreign demand. Moreover, the fins can be easily processed and stored, as they do not require sophisticated treatment and storage facilities such as cold stores. In general fins exported by African countries are considered of low quality as very often the fins are cut incorrectly from the main shark body with too much meat adhering.

Countries such as Kenya, South Africa, Senegal, Tanzania, Gambia, Tunisia export directly to Asian countries such as China, Hong Kong, Thailand and Singapore and to the USA. Shark fins are exported from Somalia mainly to Dubai where local traders re-export them to Singapore and Hong Kong⁷². Prices in Somalia are variable: in 1996 they were US\$18-22/kg for dirty cut fins, US\$28-32/kg dirty cut in Dubai and US\$34-39/kg for clean cut. All Somalian shark fins less than 20cm are exported to Yemen at US\$14-16/kg.

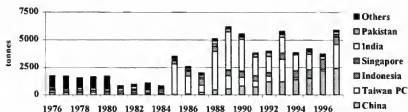
6.2.8.2 Asia

As reported to FAO, production of shark fins by Asian countries has substantially increased from 1 740 tonnes in 1976 to peak at 6 200 tonnes in 1989. In 1997 it was nearly 5 900 tonnes. China was by far the leading producer with more than 2 400 tonnes, followed by Taiwan Province of China (2 160 tonnes), Indonesia (680 tonnes), Singapore (260 tonnes), India (210 tonnes) and Pakistan (90 tonnes). Other smaller producers were the Philippines, Maldives, Republic of Korea, Bangladesh and Japan. Exports of shark fins by Asian countries have increased from 2 480 tonnes worth US\$12.3 million in 1976 to a peak of 6 150 tonnes worth US\$87.0 million, in 1997. Of the 1997 total, re-exports amounted to 1 950 tonnes, worth US\$20.0 million, reported mainly by Hong Kong. In 1997 China was the major exporter with more than 2 400 tonnes worth US\$32.7 million, followed by Hong Kong (1 955 tonnes, US\$20.0 million), Indonesia (680 tonnes, US\$9.9 million), Japan (370 tonnes, US\$13.4 million), Taiwan Province of China (260 tonnes, US\$3.1 million) and India (244 tonnes, US\$2.5 million). Other exporters were Viet Nam, Thailand, Philippines, Malaysia and in previous years Pakistan. Imports by Asian countries have grown from 3 700 tonnes worth US\$20 million to a peak of 6 930 tonnes worth US\$52.3 million in 1997. In that year China was also the leading importer with nearly 4 400 tonnes worth US\$24.8 million. Other major importers were Hong Kong (2 200 tonnes, US\$23.5 million), Malaysia (120 tonnes, US\$652 000), Indonesia (98 tonnes, US\$ 631 000), Thailand (60 tonnes, US\$682 000 million) and Taiwan Province of China (36 tonnes, US\$1.2 million) In previous

⁷² LOVATELLI A., *idem*.

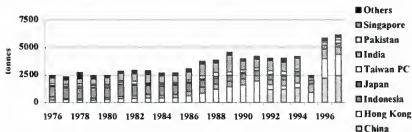
years Singapore was a major importer with a peak of 1 900 tonnes, worth US\$20.3 million in 1988.

Figure 53 Asia: production of shark fins by country in tonnes, 1976-1997



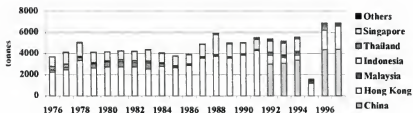
Source: FAO - FIDI

Figure 54 Asia: exports of shark fins by country in tonnes, 1976-1997



Source: FAO - FIDI

Figure 55 Asia: imports of shark fins by country in tonnes, 1976-1997



Source: FAO - FIDI

China has a long history of utilization and consumption of sharks but, as reported by Cook⁷³, shark fin was considered to be a luxury product and its consumption was discouraged under post-war governments. However, since the mid 1980s, political and economic alterations in China have

⁷³ COOK S., "Trends in shark fin markets: 1980s, 1990s and beyond", Chondros, 15 March 1990.

led to a spectacular growth in domestic consumption of shark fins and to repercussions on world fin prices and trade. China started to play a significant role in world shark fin trade as a consumer and a processing centre. Chinese tariffs on fins were substantially reduced either for the reciprocal trade classification (tariffs pertinent to countries/territories with which China has favourable trade treaties) or in general.

Table 23 Chinese tariffs on shark fins 1980-1998 (%)

| Year | Reciprocal tariff | | General tariff | |
|---------|-------------------|-----------------|----------------|-----------------|
| | Dried | Salted/in brine | Dried | Salted/in brine |
| 1980-84 | 185 | 185 | 285 | 185 |
| 1985-90 | 95 | 95 | 115 | 95 |
| 1991-92 | 95 | 65 | 115 | 85 |
| 1993 | 90 | 35 | 115 | 45 |
| 1994-95 | 72 | 72 | 97 | 97 |
| 1996-98 | 55 | 55 | 80 | 80 |
| 1998-99 | 30 | 30 | 80 | 80 |

According to FAO statistics, in 1997 China was the leading producer, importer and exporter of shark fins in the world. Prices for shark fins are affected by their size and larger fins are preferred. According to the study by INFOYU and reported as Appendix IV.4 of this report, shark fins are imported as raw material and prepared shark fins are the major export and/or re-export shark products. Among shark fins imported are those of requiem sharks (from Japan, Spain and Singapore), scalloped hammerhead (from Spain), picked dogfish (from Japan) and blue sharks (from Indonesia and Peru). China exports or re-exports shark fins of the following species: scalloped hammerhead, blue sharks (to Japan), shortfin mako (to Japan), picked dogfish (to Hong Kong and Japan) and requiem sharks (to Japan, Spain and Singapore). In 1998 China imported about 4 240 tonnes of shark fins worth US\$24.7 million. Japan was the main supplier with 2 700 tonnes worth US\$18.6. Other major suppliers were Spain, Singapore, Indonesia, Hong Kong, Viet Nam, Norway, Costa Rica, Ecuador, Peru, and Fiji. In the previous years Malaysia, Taiwan Province of China, Uruguay, Australia, Brazil, USA, Republic of Korea, Guinea, South Africa, UK, Thailand, Philippines and United Arab Emirates were also significant suppliers. In 1998 China exported 2 000 tonnes of shark fins worth US\$31.7 million. These exports also include re-exports. Hong Kong was by far the main outlet, taking 96.3% of the volume and 96.2% of the value of total exports. Other markets were Japan, Singapore, Macau, USA, Spain and France. In previous years Malaysia, Republic of Korea and Taiwan Province of China also received significant amounts. According to Parry-Jones⁷⁴, Chinese fishermen often sell shark fins directly at sea to fishermen of other countries/territories such as Republic of Korea, Hong Kong, Japan and Taiwan Province of China where they obtain higher prices than those offered by mainland traders. More information on the Chinese market can be found in Appendix IV.4.

Hong Kong⁷⁵ is a trader, processor and consumer of shark products, with each activity influencing the other. The most important shark product traded in Hong Kong is shark fin and this country is the most important market for shark fins in the world. Hong Kong has minimal domestic shark landings and all shark fins traded consist of imports and re-exports. Hong Kong

⁷⁴ PARRY-JONES R., *idem*, 1996.

⁷⁵ This paragraph is mainly based on Appendix IV.1 of this report. "Hong Kong" by HOOI KK.

has substantially increased its imports of shark fins in recent years. In 1972 they amounted to 2 400 tonnes, in 1982 they were 2 750 tonnes, in 1993 they reached 5 300 tonnes and 7 850 tonnes in 1996, according to the Census and Statistics Department⁷⁶. Some of the imports are re-exported without further processing. In its trade statistics Hong Kong distinguish the category "domestic exports" (fins produced locally) from other exports, whether of local or foreign origin, which are further processed. The volumes of these domestic exports are small in comparison with those of imports and re-exports. Total re-exports amounted to 5 330 tonnes in 1996⁷⁷. These and the previous figures differ from those reported to FAO which were 1 850 tonnes of imports in 1996 and 1 780 tonnes of re-exports. In 1997 they were, respectively, 2 200 tonnes and 1 950 tonnes. Shark fins are traded in dried and wet forms. According to Hooi⁷⁸, the average annual per capita consumption of dry fins in Hong Kong during 1993-6 was 387g. The average price of imported fins at this time was HK\$294.1/kg. In Hong Kong shark fin is perceived as a food that promotes one's health and is of value in the Chinese worldview. It is served at banquets for special occasions such as weddings or birthdays. Consumption of shark fins is highest in the period October-February, typically months for weddings and other feasts and it culminates at the time of Chinese New Year. Shark fin soup became popular after World War II. Its popularity increased in the 1970s and consumption has grown since. Hong Kong imports shark fins from many countries such as China, Singapore, Spain, USA, Taiwan Province of China, Thailand, Senegal, Pakistan, Philippines, Republic of Korea, Mexico, New Zealand and exports to China, Singapore, USA, Republic of Korea, France, Netherlands, UK, Germany and Malaysia. According to Parry-Jones⁷⁹, hammerheads, mako, blue, thresher, white, tiger, oceanic whitetip, blacktip and dusky shark are among the preferred species. Despite the fins of blue sharks being considered of low quality, due to their low fin needle content, they are amongst the major species traded as they are often taken as bycatch. As reported by Parry-Jones⁸⁰, estimates by fin traders suggest that blue shark may comprise 50 to 70% of the shark fins traded in Hong Kong. Fins are usually imported in raw, dried form and then processed by local people or re-exported to China and then re-imported after processing. The role of China in processing shark fins to be re-exported to Hong Kong has substantially increased since the Chinese policy reform in 1996, which allowed shark fin business operations to be set up of in China. Further information on this market may be found in Appendix IV.1.

According to FAO statistics, production of shark fins by Taiwan Province of China has fluctuated greatly in the period 1976-97, peaking at 3 500 tonnes in 1988. In 1997 it amounted to 2 160 tonnes, representing a substantial increase from 160 tonnes reported in 1996. Exports of shark fins have increased in the last few years but are not very consistent. There was a peak of 2 60 tonnes worth US\$3.1 million in 1997. Imports also are not very significant with a maximum of 96 tonnes worth US\$1.8 million in 1989. In 1997 imports were 36 tonnes, valued at US\$1.2 million. Shark fins are consumed in Taiwan Province of China. Long, wide shark fins with a rough texture and high density of spindles are judged of better quality⁸¹. Smooth hammerhead (*Sphyrna*

⁷⁶ As reported by HOOI K. K. in Table 1 of Appendix IV.1 of this report.

⁷⁷ Source: Census and statistics department, from Table 1, HOOI K. K., idem.

⁷⁸ HOOI K. K., idem.

⁷⁹ PARRY-JONES R., "TRAFFIC report on shark fisheries and trade in Hong Kong", in "TRAFFIC report on shark fisheries and trade in the East Asian region", of the "The world trade in sharks: a compendium of TRAFFIC's regional studies volume I", TRAFFIC, 1996.

⁸⁰ PARRY-JONES R., idem, 1996.

⁸¹ CHEN G C T, LIU K. M., JOUNG S. J., PHIPPS M. J., "TRAFFIC report on shark fisheries and trade in Taiwan", in "TRAFFIC report on shark fisheries and trade in the East Asian region", of the "The world trade in sharks: a compendium of TRAFFIC's regional studies volume I", TRAFFIC, 1996.

zygaena) and dusky sharks are considered of superior quality. The great bulk of exports of shark fins from Taiwan Province of China go to Hong Kong. Other markets are China, Malaysia, USA, Singapore and Republic of Korea. Major suppliers to the market are Indonesia, Hong Kong and Singapore.

Singapore is an important centre for trade and consumption of shark fins. These products are mainly consumed in restaurants due to the long preparation time of the shark fin soup. Shark fins can be found in canned form in markets and supermarkets. Brown shark and blue sharks are the most popular species imported. Other species are hammerhead, tiger and white sandbar sharks. Main suppliers to the Singapore's market are Hong Kong, Thailand, India, Yemen, Japan, Spain, and Taiwan Province of China. Singapore did not report its production and trade data since 1995 to FAO but in 1994 it was the second world exporter and importer of shark fins. According to the statistics reported by Chen in Appendix IV.2 of this report³², imports of dried or salted shark fins peaked in 1988 at 1 900 tonnes and were 930 tonnes in 1996, while imports of prepared shark fins peaked at 144 tonnes in 1995 and decreased to 71 tonnes in 1996. Singapore exports shark fins to countries such as Hong Kong, Taiwan Province of China, China, Indonesia, USA, France, UK and Germany. More information on this market can be found in Appendix IV.2 of this report.

Japan is an important producer and exporter of shark fins. According to FAO statistics, in 1997 Japan was the world-leading exporter of dried, unsalted shark fins in value terms. Fins from Japanese vessels are judged of good quality and are processed by dealers. The bulk of the Japanese production of shark fins is exported as there is a very limited consumption at home, generally limited to Chinese restaurants. The fins of mako, hammerhead and sandbar are better appreciated and large fins are preferred to small ones. Fins of blue and salmon sharks are considered of lesser quality but are more available and less expensive. Only the lower section of the tail fin of blue sharks is used to prepare the soup. Imports of shark fins are not reported in Japanese statistics but, according to the records of Japanese trading partners, Japan imports limited amounts of shark fins, mainly from Taiwan Province of China. These imports are often re-exported to countries such as Hong Kong and Singapore. According to Japanese national statistics, Japan exported 370 tonnes of dried shark fins worth US\$13.4 million in 1997. The great bulk was directed to Hong Kong (286 tonnes worth US\$11.9 million) followed by China, Indonesia, and Singapore. The volume of Japanese exports of shark fins have consistently declined from 1 070 tonnes in 1981 to 370 tonnes in 1997. Japan also produces artificial shark fins, which are generally exported. More information on the Japanese shark fin market can be found in the section on Japan in this publication.

The main products of the Indonesian shark fisheries are fins and tails. The fins are mainly destined for foreign markets while domestic consumption is mainly in Chinese restaurants. According to Keong³³, Jakarta, Surabaya (East Java) and Ujung Pandang (South Sulawesi) are the dominant fin exporting cities, with ethnic Chinese traders prevailing in this business. Keong also reports that, according to one exporter, the fins may be bought and sold up to ten times before they actually leave the country. Species, processing and size are the determinants of fin prices. The first and second dorsal fins and the upper lobe of the caudal fin from the white-spotted guitarfish are considered to be most valuable. The preferred shark species for fins are tiger, mako, sawfish, sandbar, bull, hammerhead, blacktip, porbeagle, thresher and blue shark. In 1995, fully processed

³² The trade development board statistics - Imports and Exports reported in table 1.1.1 of Appendix IV.2 of this report, author CHEN S.F.

³³ KEONG C.H., "Shark fisheries and trade in sharks and shark products in Southeast Asia", in "The world trade in sharks: a compendium of TRAFFIC's regional studies", vol. II, TRAFFIC, 1996.

fins were sold dried and packaged in supermarkets for up to US\$330/kg. Small blacktip shark fins were sold fresh in Muara Angke (Jakarta's fishing harbour) for US\$1 80/kg, small dried blacktip shark fins were quoted at US\$6/kg, and large dried fins, suspected to be from a hammerhead shark, were priced US\$132/kg. Dried shark fins have been exported from Indonesia in consistent volumes for at least two decades. According to FAO statistics in 1996 Indonesia was the third largest exporter of shark fins in the world. In 1997 Indonesia exported⁸⁴ 676 tonnes worth US\$9.9 million of which 54.6% in volume were directed to Singapore, 15.1% to Taiwan Province of China, 13.5% to Hong Kong and 11.5% to Japan. In 1997 Indonesia imported⁸⁵ 98 tonnes of dried shark fins worth US\$630 710. Japan was the major supplier with 49 tonnes, followed by UK, Curaçao, Singapore, Spain and Singapore. Imports from Singapore have the highest unit value (US\$33.6/kg), followed by those from Spain (US\$14.6/kg) and the USA (US\$12.5/kg).

In 1997 Republic of Korea exported 22 tonnes of shark fins worth US\$815 000, with Singapore as the main market. In previous years other major destinations were Hong Kong and China. In 1997 imports of shark fins amounted to 11 tonnes worth US\$664 600. Spain supplied 65.7% of the imports, followed by Hong Kong, the Philippines, Somalia and Viet Nam. Shark fins are not part of the traditional Koran cuisine and they are usually only eaten in Chinese restaurants.

In 1996 Thailand exported 27 tonnes of shark fins, worth US\$1.8 million of which 84% went to Hong Kong. Other markets were Singapore, Japan, Australia and China. In 1997 Thai exports were 37 tonnes, valued at US\$2.0 million. In 1996 Thailand imported 138 tonnes, 80.8% of which came from Hong Kong. Other major suppliers were the USA, India, Pakistan, Indonesia, United Arab Emirates, Japan, Spain and Norway. In 1997 Thailand imported 98 tonnes, valued at US\$682 000.

Malaysia is a consumer of shark fins. Singapore and Indonesia are the main suppliers to the Malaysian market followed by Australia, Hong Kong, Fiji, Philippines and Maldives. Malaysia exports limited volumes of shark fins, with Thailand as its major market. In 1997 Malaysia exported 31 tonnes, worth US\$173 000 and imported 122 tonnes, valued at US\$652 000. Information on the Malaysian market can be found in Appendix IV.2 of this report.

The Philippines exports shark fins to Hong Kong, Singapore, Republic of Korea, Brunei, China and Australia. Fins are sold fresh or dried. Pakistan exports fins mainly to Hong Kong, Singapore and Thailand but also to the Republic of Korea, Burma, Norway, Sri Lanka and UK. In 1997 the Philippines exported 34 tonnes, worth US\$422 000.

In India almost all the shark fins are exported. Domestic demand for fins is chiefly in major hotels. In India shark fins are available in Gujarat, Konkan coast, Orissa, Tamil Nadu and Andhra Pradesh. Fins are also sold in large quantities by the Lakshadweep Fisheries Department. In recent times fins have become available in the Andaman Islands where a good commercial shark fishery is established. The major varieties exported are ranja, pison and khada in order of importance, ranja commanding the highest market price. According to Varma⁸⁶, the following four species are usually collected for export of shark fins: Hammerhead/round headed shark (*Sphyrna zygaena*), grey dog shark (*Rhizoprionodon acutus*), sharp-nosed/yellow dog shark (*Scoliodon laticaudus*) and black finned/black tip shark (*Carcharhinus melanopterus*). Most of the shark fin exports are

⁸⁴ "Indonesia foreign trade statistics, Exports, vol. I, 1997", Badan Pusat statistik, Jakarta, Indonesia, 1998.

⁸⁵ "Indonesia foreign trade statistics, Imports, vol. I, 1997", Badan Pusat statistik, Jakarta, Indonesia, 1998.

⁸⁶ VARMA R.A.M. idem, 1998, Appendix IV.3 of this report.

directed to Hong Kong and Singapore. Recently new markets have emerged such as UK, USA, Malaysia, Germany and Taiwan Province of China. According to FAO statistics, in 1997 India produced 211 tonnes and exported 244 tonnes, worth US\$2.5 million.

6.2.8.3 Europe

European countries report nothing concerning trade in shark fins to FAO because these products are not covered by EUROSTAT statistics nor by most national statistics. European countries import processed dried fin noodles and prepared products such as canned fin soup. These products are imported from Asian countries such as Hong Kong, Singapore, Malaysia, Thailand and from African countries such as Tanzania. They are all destined for the Chinese communities in the main European cities, with France as the main importer, where they are sold in shops and ethnic restaurants. In the last few years Spain has developed an interesting export market for shark fins. Major destination markets for Spanish fins are China, Republic of Korea, Hong Kong and Thailand. Spain has increased its share of Chinese imports of shark fins in the last few years. Chinese import statistics show that in 1996 China imported 424 tonnes of shark fins worth US\$1.6 million from Spain. By 1997 this had increased to 834 tonnes worth US\$3.2 million and in 1998 it was 1 040 tonnes worth US\$3.9 million. The trade statistics of Asian countries such as Hong Kong, Thailand and Singapore report imports of shark fins from Spain and from other European countries such as Portugal, Poland, France, Germany, Iceland, Norway and UK. Exports are mainly fins of blue sharks, picked dogfish, shortfin mako and thresher sharks.

6.2.8.4 North and Central America

According to FAO statistics, production and trade in shark fins by North American countries is rather limited, with the USA as major dealer. No production data are reported. In 1997 exports of shark fins only amounted to less than 500 kilograms, reported to FAO by Costa Rica, Mexico and El Salvador. Imports came to 78 tonnes, worth US\$3.2 million, reported to FAO mainly by the USA. USA import data shows various Central American countries such as Costa Rica, Ecuador, El Salvador, Guatemala, Nicaragua, Panama and Trinidad and Tobago as suppliers of shark fins

In 1998 US exports of shark fins were recorded for the first time at 146 tonnes, worth US\$1.3 million, of which 6 tonnes, valued US\$43 500 were re-exports to Hong Kong. This latter imported 95.8% of the volume and 98.3% of the value of total US exports of shark fins and the rest went to Japan and China. The USA began to increase its production and exports of shark fins in the late 1970s, with considerable expansion in the following decades. US processors usually dry or freeze fins whole, export them to Hong Kong and Singapore for processing and then re-import the processed products. Fins of picked dogfish are often processed yet they are internationally considered of lower value than fins from other species. Hammerheads and sandbar shark are considered to be better quality, followed by those from tiger, blacktip, dusky, bull and silky sharks. US imports of dried shark fins have increased considerably but in 1998 a year on year decline of 19.9% in volume and 44.5% in value were experienced to reach 62 tonnes worth US\$1.7 million. Major suppliers were Australia, Argentina, Mexico, Hong Kong, Brazil and Gambia. The domestic market for shark fins is expanding due to the abundant Chinese populations, mainly in urban areas on the East and West coasts such as San Francisco, Los

Angeles and New York. Shark fins imported from Asian countries such as Hong Kong, Korea and Taiwan Province of China consist mainly of dried or processed fins, fin nets or canned shark fin soup. These products are sold in ethnic shops and in restaurants. For more information on this market, see the US section of this publication.

Although Mexico is a significant supplier of shark fins, particularly to the USA, shark fins are rarely identified separately from other shark or fishery products in Mexican fisheries and export statistics. Exports of shark fins are said to have increased substantially in the last few years. Mexico exports shark fins to Asian countries such as Hong Kong, Singapore, Thailand and Taiwan Province of China as well as to the USA. According to Rose⁸⁷, US imports of shark fins from Mexico are usually of low-quality cut and so vulnerable to spoilage but, because of their abundance and the low cost of transport, they are imported in consistent volumes. They are then typically re-exported, frozen or dried, to Asia for processing.

6.2.8.5 Latin America

Brazil and Uruguay are the only Latin American countries that report production of shark fins to FAO. In 1997 Uruguay was the main producer with only 5 tonnes, but in the previous years this role was played by Brazil with 190 tonnes in 1996 and a peak of 370 tonnes in 1993. All of Brazilian production of shark fins is exported and it is the chief Latin American exporter of these products. In 1997 total Latin American exports amounted to 18 tonnes worth US\$535 000, representing a substantial decline from the 205 tonnes, worth US\$ 2.4 million in 1996 and from the peak of 477 tonnes, valued at US\$3 8 million in 1993. Beside Brazil, other exporters are Uruguay, Guyana, Suriname, Chile, Ecuador and Peru. As reported by Caro Ros in Appendix IV.5 of this report, most Latin American countries export shark fins to Asian countries such as Hong Kong, Singapore and Taiwan Province of China. In Uruguay the framework of agreements between vessel owners and crews gives the latter a right to a determined percentage of the vessel's catch ("*la valija*") as well as the already dried shark fins that have been collected during the voyage. Practically 50% of these shark fins are sold directly to dealers or intermediaries at the dock, almost always evading custom controls. In Argentina fins generally arrive at the dock almost as an end product and are traded by brokers who buy them directly on the dock. The average fob price for fins exported from Argentina to Hong Kong in the last six years is US\$12.3/kg for smooth-hounds and US\$27.4/kg for other shark species. Also Chile exports shark fins to Asian countries such as Hong Kong, Japan, Singapore and Taiwan Province of China. The average fob prices for these exports to Asian countries are US\$37.1/kg for shortfin mako, US\$35.1/kg for blue sharks and US\$37.7/kg for sharks not specified.

6.2.8.6 Oceania

Only Fiji reports its production of shark fins to FAO, which amounted to less than 500 kilograms in 1997 and to 20 tonnes in 1996. In 1997, either exports and imports were less than 500 kilograms. Only Solomon Islands, Kiribati, Vanuatu and Fiji reported exports of shark fin, and only Australia and Marshall Islands reported imports. Yet examination of the import statistics of countries such as the USA, Republic of Korea, Malaysia and Hong Kong shows volumes of shark fins exported from New Zealand, Australia, Fiji and Solomon Islands.

⁸⁷ ROSE D., *idem*, 1998.

Most Australian imports go to Victoria and New South Wales. The main suppliers are Hong Kong, Japan, Singapore, Thailand, the Philippines and Fiji. Exports are not reported by Australian customs but the statistics of importing countries reveal exports to Asian countries such as Hong Kong, Singapore, Malaysia and Republic of Korea.

6.3 INTERNAL ORGANS AND OTHER EDIBLE PRODUCTS

No statistics exist on trade, production or consumption of the other edible parts of shark.

Shark skin is eaten in various parts of the world, particularly in Japan, Taiwan Province of China, Solomon Islands and Maldives. Shark skin is usually dried, then the dermal denticles are removed, the skin bleached and dried again⁸⁸. In Japan shark skin with flaws are used to produce the gelatinous food *nikigori*⁸⁹. In Taiwan Province of China, skin from the dusky shark and the whale shark is served in restaurants, as is also the upper part of the tail fin from thresher sharks. White-spotted guitarfish (*Rhynchobatus djiddensis*) gives the best quality skin from the tail fin⁹⁰. In the Solomon Islands shark skin is salted, dried or smoked with little meat left on the skin. Usually it is salted and then sun dried or smoked. Then it is boiled and the denticles rubbed off. Finally it is cooked with coconut milk to prepare soup⁹¹.

Processing of the product called shark lips involves removing the denticles from the dried skin, bleaching with hydrogen peroxide, rinsing with water to remove the residual bleaching agent and re-drying before marketing. It is rehydrated before cooking. The cooked skin is soft, smooth and juicy and is sold in Singapore and Malaysia under the name fish lips.

Shark stomach is eaten in the Solomon Islands, Australia, Taiwan Province of China and Uruguay. In the Solomon Islands processing of shark stomach is similar to that for shark skin described above.

Shark liver has been traditionally used as food in the Solomon Islands and China, amongst others. In the Solomon Islands the liver is sliced, salted and eaten but it can also be eaten fresh after harvesting and cooking or preserved by salting and, much later, cooked before eating⁹². According to Tanikawa⁹³, after the shark liver oil has been separated, the residue, called "cooked skin of whale", is eaten as a delicacy in the Osaka district of Japan.

Shark cartilage is used as an ingredient for soups as it is considered a healthy tonic in the East Asian region. For example, Tanikawa⁹⁴ described the processing of boiled-dried

⁸⁸ CHEN G.C.T. et al, *idem*, 1996.

⁸⁹ KIYONO H., "TRAFFIC report on shark fisheries and trade in Japan", in "TRAFFIC report on shark fisheries and trade in the East Asian Region" "The world trade in sharks: a compendium of TRAFFIC's regional studies", TRAFFIC Network, 1996.

⁹⁰ CHEN G.C.T. et al, *idem*, 1996.

⁹¹ MATTHEW P., *idem*.

⁹² HOOI K.K., "Non-food uses of sharks", Appendix II of this report.

⁹³ TANIKAWA E. "Marine products in Japan". Koseisha Koseikaku Co. Ltd., Tokyo, 1985.

⁹⁴ TANIKAWA E., *idem*.

cartilage (*meikotsu*) made from pieces of jaw, fin and head parts. These are soaked in hot water, the meat is removed and then the cartilage is boiled and sun-dried. This product was also exported to China and possibly eaten as a health supplement as well⁹⁵. In Hong Kong dried shark cartilage is sold as vertebral columns or as a by-product of shark fin processing. The former are mostly imported into Hong Kong from North and South America. They are cooked and eaten as food or boiled in soups or with herbs to improve health⁹⁶.

In the Maldives gulper shark eggs are eaten. Salmon shark heart is prepared as *sashimi* in Kesenuma, Japan.

6.4 NON-FOOD USES

In the following paragraphs a brief analysis of non-food uses of sharks is reported. More information on this subject can be found in the Appendix II of this report, written by Hooi K. K.

6.4.1 Shark liver oil products

Sharks have no swim bladder and their large livers saturated with oil maintain their buoyancy in water. Deep sea sharks such as gulper shark (*Centrophorus granulosus*), smallfin gulper shark (*Centrophorus scalpratus*), basking shark and tope shark are the major species targeted for this purpose, as they contain a higher yield of oil. Kreuzer and Ahmed⁹⁷ report that the size and weight of a shark's liver varies by species and season. The weight of the liver of some shark species constitutes almost one fifth of its weight. Weight tends to increase with size as the larger the shark, the greater the relative weight of the liver. The ratio of liver weight to total body weight of some species is as follows:

| | |
|--|-------|
| Kitfin (<i>Dalatias licha</i>) | 19.2% |
| Tiger (<i>Galeocerdo cuvieri</i>) | 17.5% |
| Salmon (<i>Lamna ditropis</i>) | 12.0% |
| Thresher (<i>Alopias pelagicus</i>) | 10.0% |
| Soupfin (<i>Galeorhinus japonicus</i>) | 2.9% |

The traditional uses of shark liver oil have been:

- As a lubricant in the tanning and textile industries. Crude liver oil containing squalene was used as a lubricant because it has a melting point of -75°C and a boiling point of 330°C .
- In cosmetics and skin healing products.
- In health products and traditional foods.
- To coat the hulls of wooden boats as a preservative against marine fouling.

⁹⁵ HOOI K. K., idem, Appendix II.

⁹⁶ HOOI K. K., idem, Appendix II.

⁹⁷ KREUZER, AHMED R., idem.

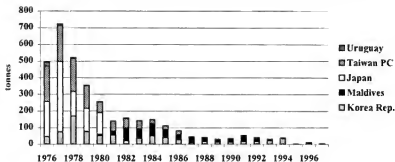
- As fuel for street lamps.
- To promote the healing of wounds, irritations of the respiratory and gastrointestinal tracts and general debility by fishermen in Scandinavia in ancient times. By the early 19th century its use there had ended except for a few isolated fishing communities.
- To produce Vitamin A during World War II, particularly in the USA and Australia. This led to an extensive fishery for tope shark and pickled dogfish. The market in shark livers collapsed when synthetic imitations became available.

Nowadays, demand is mainly for squalene oil, which is used in cosmetics, health food, and as high-grade machine oil. Squalene is a highly unsaturated aliphatic hydrocarbon, present in certain shark liver oils, mainly of the family Squalidae, and in cod liver oil, olive oil, wheat germ oil, rice bran oil and other vegetable oils. Although its occurrence was first reported by Tsujimoto in 1906, it was isolated only in 1926 by Heilborn *et al.* Shark liver oil is a natural source for this hydrocarbon and squalene is isolated from fish oil by high vacuum distillation. It can easily produce oxygen by combining with water and many studies have been related to its role of oxygen carrier. Some sharks have as much as 90% squalene in the liver and, because of its low specific gravity, thus maintain their buoyancy in water. Squalene is used as a bactericide, an intermediate in the manufacture of pharmaceuticals, organic colouring matter, rubber, chemicals, aromatics, in finishing natural and artificial silk and surface active agents. Nowadays it is extensively used as an additive in pharmaceutical preparations, cosmetics and health foods. It is prepared by adding proteins and carbohydrates.

A related compound of squalene is squalane, a saturated hydrocarbon obtained by hydrogenation of squalene. Squalane is also used in skin care products, as it is a natural emollient. It is less easily oxidised than squalene. Other chemical compounds found in shark liver oils are diacyl glyceryl ethers, which are considered to be efficient in healing wounds and in preventing the multiplication of bacteria.

According to FAO statistics, world production of shark liver oil has decreased from nearly 500 tonnes in 1976 to only 4 tonnes in 1997, 2 tonnes from Maldives and 2 tonnes from Republic of Korea. In 1976 Taiwan Province of China was the major producer with 213 tonnes, followed by Japan with 211 tonnes. The peak of production was recorded in 1977 at 720 tonnes, with 420 tonnes from Japan. Japan has not recorded its production of shark liver oil since 1980 but has included it with other fish oil in Japanese statistics. Taiwan Province of China has decreased its production of shark liver oil substantially to only 2 tonnes in 1994. Exports of shark liver oil have never been very significant, only amounting to 5 tonnes worth US\$3 000 in 1976, peaking at 992 tonnes worth US\$5 million in 1985 (with Portugal as the main exporter with 936 tonnes) and were at nearly 140 tonnes, worth US\$1.2 million in 1997. In 1997 Norway was by far the main exporter with 130 tonnes, valued at US\$1.2 million, followed by Republic of Korea, Maldives and the Philippines. Reported imports of shark liver oil have been more consistent in the late 1980s/early 1990s, with a peak of 821 tonnes, valued US\$9.3 million, in 1991. In 1997 they were 190 tonnes, worth US\$726 000, with Norway as major importer (154 tonnes, US\$358 000) in terms of volume and Republic of Korea in terms of value (38 tonnes, US\$368 000).

Figure 56 World production of shark liver oil by country in tonnes



Source: FAO – FIDI.

Japan used to be one of the world's major producers and exporters of shark liver oil. Between 1926 and 1940 Japan produced more than 3 800 tonnes annually on average. This declined in the following decades to average 220 tonnes per annum between 1973 and 1980. Production statistics have not been available since 1980. During the Second World War shark oil was used as a lubricant in combat aircraft and there was a substantial increase in demand. Statistics on Japanese exports and imports of shark liver oil are also unavailable, as it is included in the general category of fish oil. Nowadays it is an important component of cosmetics and health products and is also used in sanitary wipes used for cleaning toilets⁹⁸

In the USA from 1930-50 shark liver oil was used in the production of vitamin A, with tope as the preferred species, but this manufacture ended when vitamin A was synthesised in the 1950s. Nowadays, there is a limited production of shark liver oil capsules, which is directed more at external markets than the domestic one. Yet, shark liver oil is now being promoted and sold as a cure for cancer in the same way as cartilage, albeit on a slightly smaller scale, and also as a cure for arthritis, psoriasis and many other ailments. One of the uses of liver oil is as an ingredient in Preparation H, an over-the-counter haemorrhoid ointment produced in the USA and distributed internationally⁹⁹. Shark liver oil has been used for the tanning and curing of leather. Squalene is used in pharmaceuticals and cosmetic products such as skin creams.

In the Republic of Korea locally processed shark liver oil was previously used for paint and cosmetics, although nowadays it is used mainly as animal feed¹⁰⁰. Crude shark liver oil (most probably squalene rich oil) is imported into Republic of Korea where it is packed locally and sold for human consumption in tablet and capsule form. Nowadays, Republic of Korea is considered to be one of the world's major consumers of shark liver oil.

⁹⁸ KIYONO H, *idem*.

⁹⁹ ROSE D.A., "Shark fisheries and trade in the USA" in ROSE D.A. "Shark fisheries and trade in the Americas". TRAFFIC, USA, 1998.

¹⁰⁰ PARRY-JONES, "TRAFFIC report on shark fisheries and trade in the Republic of Korea", in TRAFFIC report on shark fisheries and trade in the East Asian region", in "The world trade in sharks: a compendium of TRAFFIC's regional studies", vol. I, TRAFFIC, 1996.

In China shark liver is used in the production of medicines and cosmetics. In India shark crude oil (the liver oil which is not suitable for pharmaceutical use) is used for painting boats as a local preservative. The use of shark liver oil for medical purposes is limited¹⁰¹.

In Europe demand for shark liver oil is not very high except for France and Germany. French companies use shark liver oil and squalene in the manufacture of cosmetic and pharmaceutical products. It is used in the production of perfumery and cosmetics such as milk, lotions, creams and oil for the skin and hair. In Germany demand for shark liver oil was high in the past, particularly in the textile and leather business, for paints and varnishes and for cosmetics. Nowadays, it is also used in pharmaceutical products such as ointments and capsules.

In Africa shark liver oil is traded domestically within Eritrea, Somalia, Kenya and Madagascar for use in the maintenance of traditional fishing vessels¹⁰². Madagascar and Maldives export limited volumes of shark liver oil.

6.4.2 Shark cartilage

Sharks have a skeletal structure of cartilage instead of bone. There is a growing interest in the use of their cartilage in health supplements and as an alternative cure for certain diseases. Health supplements are also produced for pets and horses. Many claims, not scientifically proven, attribute to shark cartilage the role of being beneficial in cases of asthma, candidiasis, eczema, allergies, acne, phlebitis, peptic ulcers, haemorrhoids, arthritis, psoriasis, diabetic retinopathy, neovascular glaucoma, rheumatism, AIDS and above all cancer. Shark cartilage is considered beneficial in inhibiting the growth of tumours by impeding the vascularization of malignant tissues (angiogenesis).

Production and trade of shark cartilage is not documented. The markets for shark cartilage have substantially increased in the last few years, and prices are quite high. Major producing and consuming countries are the USA, Japan, Australia and India. Products with shark cartilage are sold also in Europe, Hong Kong, Taiwan Province of China, Singapore and many other countries. Products are produced in powder, capsule, and tablet form.

Unlike shark liver oil, which tends to glamorize deep-sea sharks, shark cartilage is made from both deep-sea and tropical sharks and the tablets manufactured from both types of sharks are sold in similar strengths¹⁰³. Cartilage from blue shark is considered to be the best quality, as it is believed richer in chondroitin than those of other species. Chondroitin is an acid mucopolysaccharide, which is present in most mammalian cartilaginous tissues and is used for various health problems.

The USA represents one of the major producing country of products such as powder, creams and capsules manufactured from the cartilage of sharks. These products are sold on the domestic market and pre-packaged cartilage products are marketed and exported to about 35 countries under a variety of brand names.

¹⁰¹ HANFEE F., *idem*

¹⁰² BARNETT R., *idem*.

¹⁰³ HOOI K. K., *idem*, Appendix II.

Japan produces shark cartilage powder and capsules. These products are marketed for domestic use but they are also exported to countries such as the USA and Mexico and imported from the USA, New Zealand and Australia. Shark cartilage is used in Japan as a treatment for eye fatigue and rheumatism, with that of blue shark particularly appreciated.

Taiwan Province of China exports processed and unprocessed cartilage to Australia, New Zealand, Japan and USA and imports shark cartilage powder from the USA and Japan.

In Europe there is a growing market for shark cartilage products, with the UK and Spain as major distributors to other European countries.

6.4.3 Shark skin

The Chondrichthyes have rough and hard placoid scales¹⁰⁴, which are usually minute, but vary greatly in shape. Untanned skins are called shagreen, a term which includes the untanned leather from horses and seals¹⁰⁵. Shagreen was formerly used for various polishing purposes in the arts, for armour, sword-hilts, and as a striking surface for lucifer matches.

Shark skin is also eaten as food in some countries but most of the skin used is made into leather. Shark hides are tanned in much the same way as the skins of land animals. Shark leather is used in the production of luxury items such as handbags, shoes, cowboy boots and sandals, wallets/purses, coin/key fobs, belts, key cases, lighter cases, cigar cases, watch straps, gun holsters and knife holders. In the past the skins were primarily employed for rasping and polishing wooden articles, when the denticles are left embedded in the skin, and only rarely were they used to produce leather. Among shark species whose skin is considered more suitable for the production of leather are the tiger, lemon, dusky, nurse, sandbar, porbeagle, shortfin mako, scalloped hammerhead and bull.

No statistics are available on the world production and trade of shark leather, yet the market for this product is not as it was before. In the past major producers/processors of shark skin were the USA, Mexico, Venezuela, Germany, UK and Japan.

A remarkable market for shark skin leather existed in the USA and the company "Ocean Leather Corporation" monopolised world production of shark leather for decades from 1925, handling around 50 000 shark skins annually in the mid-1980s. Now it no longer exists and only one tannery uses shark skins, along with other skins, for the production of exotic leathers. Shark leather was mainly used for cowboy boots in Texas and also for small leather goods like watchstraps and belts. The manufacture of these boots is now marginal due to a decline in popularity. With the increase in popularity of shark meat in the USA, the use of shark skin for the production of leather has become less profitable and interesting. Shark carcasses are usually sold with the skin intact in order to protect the meat and avoid oxidation. Furthermore, sharks have to be immediately bled, dressed and iced after they are caught to prevent urea from contaminating the meat, but exposure to fresh water or to ice damages shark skins. Shark skins are more often imported, with Mexico as the major supplier. Unfortunately shark skin has not been identified with its own commodity code in US statistics since 1989, when US imports were the highest

¹⁰⁴ MARSHALL A. J., 7th Edition of Parker & Haswell: "A text-book of zoology", Macmillan & Co. Ltd, 1962.

¹⁰⁵ TANIKAWA E., *idem*.

recorded at 36 800 skins, in large part from Mexico. Data on the effective actual volume of this trade is not available.

The greater part of Mexican production of shark hides is exported to the USA plus a limited volume to Europe. There is also a local production of boots and small leather goods. The exports to the USA were particularly significant during the 1980s.

Until a few years ago, the shark leather market was rather important in Germany. It was used for furniture, book bindings, shoes and handbags. Shark skin was imported as a raw material and tanned. Increasing restrictions on the German tanning industry have led to imports of tanned skins. Shark leather was imported as whole skins. Nowadays, imports and production of shark leather are fairly limited. In France shark leather is used in the production of luxury items such as handbags, wallets and jewellery. Spain imports and exports shark skin and leather according to the statistics recorded by the General Service of Statistics and Planning. These products do not seem to have a great market in Spain; they are probably imported processed or semi-processed and then re-exported¹⁰⁶.

In Japan the hides of whale and shark were used to produce leather until the 1940s¹⁰⁷, since then shark and fish skins moved into niche-leather markets, providing textural and beautifully speckled colours for purses, hand-bags, Japanese sandals, watch straps, etc..

6.4.4 Shark teeth

Shark's teeth and jaws have been used in various civilizations as functional and ceremonial objects¹⁰⁸. Nowadays their use is chiefly confined to sale as tourist curios. Demand is mainly limited to tourist areas in the USA, Mexico, UK, Africa and Asia. The biggest shark species are preferred. According to Kreuzer and Ahmed¹⁰⁹, a fully grown shark yields around 150 teeth of saleable size. Small teeth have no great value so species such as mako and white are chosen. Shark teeth are valuable if they measure at least one-half inch across the base of the root to the tip. The larger ones have been used in traditional weapons and incorporated into ceremonial items or they are made into trinkets, curios or jewellery, especially as souvenirs for tourists. Jaws are also dried and sold as curios.

6.4.5 Other uses of shark

- Many other parts of the shark have been used for pharmaceutical purposes, such as ovaries, brain, skin and stomach (as in Uruguay¹¹⁰). The use of shark parts for health benefits has a long history, especially in Chinese traditional medicine. The

¹⁰⁶ FLEMING E.H., PAPAGEORGIOU P.A. *idem*.

¹⁰⁷ TANIKAWA E., *idem*.

¹⁰⁸ ROSE, *idem*, 1996.

¹⁰⁹ KREUZER, AHMED R., *idem*.

¹¹⁰ VILLALBA-MACIÁS J., "Shark fisheries and trade in Uruguay" in ROSE D.A., "Shark fisheries and trade in the Americas" TRAFFIC USA, 1996.

first citation of the use of shark in medicine comes from the Tang dynasty (618-907 AD) with the skin and bile applied in compound recipes¹¹¹.

- Sharks are maintained live in public aquaria.
- Small sharks not suitable for trade are often used as bait.
- Processing wastes of chondrichthyans are used in the production of fishmeal for animal feed or fertilizer or to yield fish oils for industrial uses.
- Shark is used as ingredient in tanning lotions.
- Shark livers are sometimes mixed with other food and used by shrimp farmers in aquaculture.¹¹²
- Shark cartilage is also used for the production of fishmeal.
- Whole small sharks and rays or parts of their bodies may be preserved for sale as curios.
- Glue is made from certain sharks and fish, which may in turn be used in the manufacture of lacquerware.

¹¹¹ CAI J.F., 1995, reported by PHIPPS M.J., "TRAFFIC report on shark fisheries and trade in the East Asian Region", in "The world trade in sharks: a compendium of TRAFFIC's regional studies", volume I, 1996.

¹¹² CHEN H.K., "Shark fisheries and the trade in sharks and shark products in Southeast Asia", in "The world trade in sharks: a compendium of TRAFFIC's regional studies", volume II, 1996.

7. SELECTED MARKETS

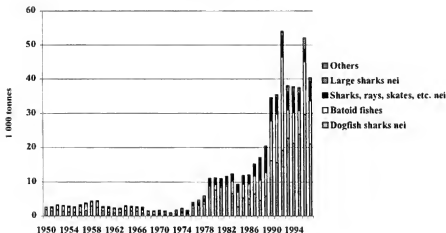
In this section the shark market for selected and significant countries will be analyzed: USA, UK, France, Germany, Italy, Spain and Japan. Other specific areas will be covered in the appendices: China, Hong Kong, Malaysia, Singapore, India, Latin America, Mediterranean area and Ghana.

7.1 USA

7.1.1 Catches

According to FAO data, US elasmobranch catches have increased considerably since 1950, when they were at 2 600 tonnes, to reach more than 40 400 tonnes in 1997. This growth was not regular, as for a long period catches were extremely limited with a slight exception in the late 1950s when they reached 4 500 tonnes. From 1968-1973 catches were very low, bottoming at 1 000 tonnes in 1972. There has been a spectacular increase since the second half of the 1970s. Catches increased steadily, with the exceptions of 1981 and 1984, from 1 700 tonnes in 1975 peaking at 54 100 tonnes in 1992. Following this they declined to 37 600 tonnes in 1995 but in 1996 they grew again to more than 52 000 tonnes. In 1997 a 22.3% decline was experienced as compared to the previous year. The real total catch of sharks is considered to be higher than that reported due to non-recorded bycatch discards and recreational fisheries.

Figure 57 US elasmobranch catches by species in 1 000 tonnes (1950-1997)



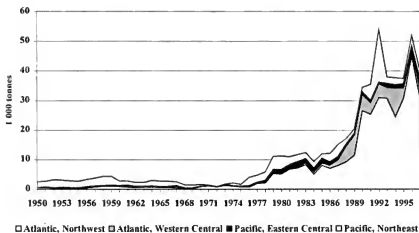
Source: FAO - FIDI.

According to FAO statistics, not identified dogfish and skates represent the two major elasmobranch groups caught by the USA. In 1997 they were respectively 21 020 tonnes and 10 140 tonnes. Other catches were "elasmobranch not identified" with nearly 5 700 tonnes, "rays, stingrays, mantas nei" with 2 500 tonnes, "large sharks not identified" (*Squaliformes*) with 1 080 tonnes and 1 tonne of blacktip shark and 1 tonne of longfin mako shark. In previous years pelagic thresher, dusky, sandbar, nurse shark, shortfin mako, porbeagle and picked dogfish were reported.

From 1979-1983, most of the elasmobranch catches by the USA was composed of dogfish. These catches declined in 1984 to less than 2 800 tonnes from 6 600 tonnes in the previous year. Since then they have grown, with a few exceptions, to peak at more than 29 600 tonnes in 1996. In 1997 they declined to 21 000 tonnes. Landings of *rajiformes* have also increased. In 1950 they were only 73 tonnes and, with the exception of 1951, they remained under 100 tonnes until 1970. The relevant growth began from 1983 when they reached 3 400 tonnes, compared with 230 tonnes in the previous year. They peaked at 13 900 tonnes in 1996 and were more than 10 100 tonnes in 1997.

Nowadays, the great bulk of US elasmobranch catches come from the Northwest Atlantic. In 1997 landings in this area were more than 31 300 tonnes, representing 77.5% of the total harvest. 7.9% of catches were from Eastern Central Pacific, 7.7% from Western Central Atlantic and 7.0% from the Northeast Pacific. Until 1980 these catches were quite equally distributed on both coasts of the USA. Landings of sharks on the West Coast have grown steadily through 1985, but have since decreased.

Figure 58 US elasmobranch catches by fishing areas in 1 000 tonnes (1950-1997)



Source: FAO - FIDI.

Major species caught on the East Coast are: picked dogfish, bignose, blacktip, blacknose, copper, bull, dusky, lemon, night, nurse, sandbar, sandtiger, silky, spinner, tiger, scalloped

hammerhead and great hammerhead sharks. Usually fisheries target the larger species but other smaller sharks are also caught such as fine tooth, Atlantic sharpnose and blacknose. Pelagic species are often captured as bycatch in the tuna and swordfish fisheries.

On the West Coast picked dogfish dominates catches with landings of 2 270 tonnes annually¹¹³. Other important species caught are thresher shark, Pacific angelshark (*Squatina californica*) and shortfin mako. Blue and mako sharks are often captured incidentally. According to estimates derived from NMFS observer data (1990-93), mortality of blue sharks amounts to more than 12 000 annually but earlier the California Department of Fish and Game (CDFG) estimated this mortality at 15 000-20 000 sharks (300 tonnes) per year. Small amounts of angel shark were captured in the past, except for 1980 and 1986 when catches were more consistent, peaking at 546 tonnes annually. Limited quantities of leopard, bonito sharks, soupfin (tope), big-eye thresher and salmon sharks are caught by commercial or recreational fisheries. The oldest commercial fishery is for tope shark which was established during the 1930s and 1940s because of their huge livers, representing a source of Vitamin A. In the period of boom catches reached 3 400 tonnes annually. This fishery declined after 1941 and the species were nearly decimated in 1944. Fishing has continued for this species during the past two decades but only on a small scale, with catches averaging 68 tonnes to 114 tonnes annually¹¹⁴. In the late 1940s there was also a small-scale harpoon fishery for basking sharks, for their livers.

According to Holts¹¹⁵ and Cailliet et al, at the end of 1970s a series of directed fisheries for sharks was established, mainly in California, but some have declined in the following decade. Directed fisheries for thresher shark started in 1977, peaked in 1982 and 1983 but declined until 1986 when limited area and season legislation was passed due to the decline in catches and the size of specimens. In October 1990 directed fishery for this species was banned and only incidental catches are permitted. Also in 1977, Pacific angelsharks began to be directly fished, peaking at 563 tonnes in 1986. Since then there has been a substantial decline in catches as a consequence of decreasing availability of the species together with imports of cheaper shark meat. In the late 1970s a fishery for shortfin mako began, particularly as a bycatch of the drift-net fishery for swordfish and thresher shark. Mako catches increased from 1977 to 1982, declining in the following years, growing again to peak at 277 tonnes in 1987 followed by a decrease since.

US shark catches have been characterised by fluctuations which were primarily the result of variable market conditions. No extensive fisheries existed until the 1930s, even if there were limited commercial fishery in the late 1800s and early 1900s for shark oil, which was employed for lamps and lubrication. The first directed fisheries in the USA for sharks seem to be those for large sharks like tope and sandbar sharks off Port Salerno in Florida (1936-1959) and mainly for tope sharks in California since the mid 1930s. The target of these fisheries was for shark livers and hides as the oil was employed for vitamin A and the hides were manufactured into leather. Fresh and salted shark, fins and fishmeal were also prepared. The shark oil market enlarged during the Second World War when there was a considerable decrease in the supply of cod liver oil. There was a growth in catches and also the Caribbean and West Indies provided sharks to the company

¹¹³ CAILLIET G.M., HOLTS D.B. and BEDFORD D. "A review of the commercial fisheries for sharks on the West Coast of the USA", pp. 13-29 in Shark Conservation. Proceedings of an International workshop on the conservation of *Elasmobranchii* held at Taronga Zoo, Sydney, Australia, 24 February 1991, 1993.

¹¹⁴ CAILLIET G.M., HOLTS D.B. and BEDFORD D., idem.

¹¹⁵ HOLTS D.B. "Review of US West Coast commercial shark fisheries", Marine fisheries review, 50 (1), pp. 1-8, 1988.

based in Port Salerno. On the East Coast this fishery, composed mainly of sandbar sharks, peaked in 1947 at 10 514 sharks. After severe overfishing in the 1950s this shark fishery was terminated as the advent of the low cost synthetic Vitamin A made it unprofitable and other shark fisheries in the USA dwindled.

Following this, sharks were harvested moderately and only in limited coastal areas. In the USA shark meat was not traditionally highly regarded as a food. Sharks became considered to be an under-utilized species, and the US Government tried to draw fishermen's attention towards shark fishing and total use of these species (meat, fins, hide, liver and teeth). Successful food product marketing, an increased interest in sport fishing and new international market developments led to an increase in shark fishing. In the early 1970s shark meat consumption began to grow and in the mid 1970s the USA started to export shark fins to the Asian markets, mainly Hong Kong and China, as a result of political and economic variations in Asia. Since 1985 the increase in the US shark fishery became more significant, intensifying the exploitation to meet the growing demand. The domestic market for shark meat enlarged as consequence of a better marketing effort and the concurrent depletion in traditional commercial fisheries. At the same time there was more and more consistent growth in the shark fin export market due to the high demand and rising market value of shark fins, mainly in Asia. Sharks, mainly large coastal species, began to be intensively caught over broad geographical areas with target fisheries expanding principally on the US Atlantic coast. Since 1985 there have been increasing fisheries for large sharks in the Gulf of Mexico and South Atlantic with an eightfold growth in yield from 1984 to 1989. Moreover, as sharks are often being captured as an incidental bycatch of other fisheries, fishermen began to remove the fins of the sharks incidentally caught, attracted by the increasing shark fin prices, instead of releasing the sharks as they did before.

This intensive fishing pressure has led to a consistent decrease in the population of several shark species that are now considered threatened or endangered with regional extinction. According to the National Oceanic Atmospheric Administration (NOAA), between the early 1970s and late 1980s the abundance of many shark species encountered along the south-east coast of the USA has declined by as much as 80%. As sharks are slow to recover from over-harvesting, the National Marine Fisheries Service (NMFS) has approved a series of measures to help shark populations, developing a large-scale shark management plan on the Atlantic, Caribbean and Gulf of Mexico coasts in 1993. The shark fishery management plan (FMP) applies to 73 species, even if only 39 species are effectively managed through a quota system. These 39 Atlantic species of sharks are divided into three categories:

- **LARGE COASTAL SHARKS** (blacktip, whale, white, tiger, lemon, basking, sandbar, sandtiger, bigeye sandtiger, spinner, reef, dusky, silky, night, bull, bignose, Galapagos, ragged-tooth, nurse, narrowtooth, and scalloped hammerhead, smooth hammerhead, great hammerhead). These species are the major sport and commercial target species.
- **SMALL COASTAL SHARKS** (Atlantic and Caribbean sharpnose, finetooth, blacknose, bonnethead and Atlantic angel). This group consists mainly of small near-shore species, captured primarily by sport fishers and as a bycatch of shrimp longline and gillnets fisheries.
- **PELAGIC SHARKS** (longfin and shortfin mako, blue, porbeagle, thresher, bigeye thresher, oceanic whitetip, sevengill, sixgill and bigeye sixgill). These are offshore and deepwater

species caught primarily as a bycatch of tuna and swordfish longline fisheries and are targeted by sport fishers.

Dogfish, skates and rays are not managed under the plan. The goals are to prevent overfishing, encourage management of stocks throughout their ranges, establish data collection, carry out research and monitoring and increase the benefits to the nation while reducing waste. Among the measures of this initial plan were established fishing year commercial quotas and recreational bag limits. Moreover, it prohibited the use of gillnets over 2.5 km long, the transfer of sharks at sea, required the live release of bycatch and made finning illegal for both commercial and recreational fishermen. Yet, fins from landed sharks can be taken if the carcass is landed too; sharks that are captured must have a specific meat to fin ratio. Total fin landings may not exceed 5% of landed carcass weights. However, it seems that some fishermen elude this system by changing the ratios through adding spoiled and bad meat to the shark parts after weigh-in. Another common crime is to hunt the sharks during the off-season and attribute the fins to fish which are allowed to be caught. A system of data collection and reporting system was partially implemented through mandatory vessel and dealer reporting. This plan also established a shark operations team made up of Council representatives and interested parties, to advise NMFS.

This management took over ten years to be implemented due partly to the lack of appropriate data for assessment of abundance, biology, distribution, life history and catches of sharks¹⁶. In 1990 the NMFS considered the large coastal sharks as substantially overfished over their maximum sustainable yield (MSY) of 3 400 tonnes. Small coastal sharks were judged as not overfished with a MSY of 3 600 tonnes and pelagic sharks were said to be well-fished, but not overfished with a MSY of 2 800 tonnes. Annual poundage quotas have been set. They are called total allowable catches (TACs), for each of the heavily fished groups

Some provisions were implemented in the course of 1994 and 1996 and on 2 April 1997 the NMFS prohibited all directed commercial fishing for five species: whale, basking, white, sandtiger and bigeye sandtiger. It established recreational catch-and-release-only for white sharks. The annual commercial quota for large coastal sharks was reduced by 50% from 2 570 tonnes dressed weight to 1 285 tonnes per year. A precautionary commercial quota of 1 760 tonnes dressed weight per year was established for small coastal sharks. The commercial quota for pelagic sharks remained at the level of 580 tonnes dressed weight per year. There was a reduction of the recreational bag limits for all Atlantic sharks. NMFS has combined all sharks into a single bag limit of 2 sharks per vessel per trip, with an additional allowance of 2 Atlantic sharpnose sharks per person per trip. Filleting of sharks at sea is prohibited. NMFS referred to the requirement for species-specific identification by all owners or operators, dealers, and tournament operators of all sharks landed.

No plan for shark management of the West Coast shark fisheries exists. Already populations of several species are said to have fallen dramatically in recent decades and the California Fish and Game Department has since regulated the sport take of some of these species. In 1993 a bill was enacted which protected the white shark from being captured or killed by commercial fishermen along with more limited restrictions on other species and rules against finning. Since August 1997 direct fishing for white shark is prohibited in Californian state waters. Exceptions to the law are made for scientific and educational research and incidental catch in selected net fisheries.

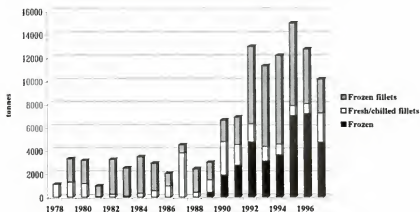
¹⁶ BONFIL R., *idem*.

7.1.2 Markets and Trade

Shark meat has only quite recently received wide consumer acceptance as seafood in the USA. There was a flourishing fishery for sharks from 1930-50 but only livers and hides were regarded as valuable. These fisheries disappeared after Vitamin A was synthesized in the early 1950s. Before the 1970s shark meat consumption in the USA was limited to small markets in coastal areas, supplied by small local fisheries. Sharks were considered to be under-utilized and intensive marketing efforts were made to popularise fresh and frozen shark meat as an alternative to tuna and swordfish whose populations were declining. Moreover, shark meat was included into school feeding programmes, where it became particularly appreciated as it is boneless. It was also introduced into the penal system and other institutional outlets. Nowadays, shark meat has an increasing share of US consumer markets and the USA has become a major supplier and consumer of shark meat and fins as well as an importing, exporting and re-exporting nation for various shark products.

According to FAO statistics, US shark production has increased considerably in the last few years to peak at nearly 15 000 tonnes in 1995. In the following two years a substantial decline was experienced in particular in frozen fillets and in 1997 total production fell to 10 200 tonnes of which 46.5% were frozen whole sharks, 28.6% frozen shark fillets and 24.9% fresh or chilled shark fillets. In 1997 production of fresh or chilled shark fillets has experienced a 197.1% increase as compared to the previous year.

Figure 59 US production of fresh and frozen sharks in tonnes

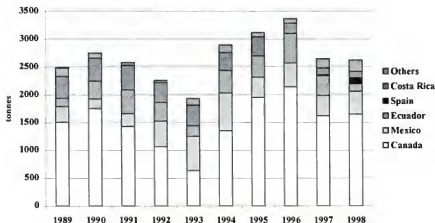


Source: FAO - FIDI.

Customs statistics for US imports and exports of fresh and frozen shark meat are available only from 1989 when they were first reported in a separate customs classification. In that year imports were nearly 2 500 tonnes, of which 92% was fresh. It is only since 1995 that imports of dogfish were separated from those of other sharks in the statistics, with Canada as the major and,

since 1997, as the only supplier of dogfish to the USA. In 1998 imports of fresh and frozen sharks were 2 620 tonnes, worth US\$3.9 million, a 0.8% decrease in volume and a 13.6 decline in value as compared to 1997, but a 22.1% decrease in volume and a 18.2% decline in value as compared to the 3 370 tonnes, worth US\$4.8 million, in 1996. In 1998 imports of dogfish were 1 530 tonnes, valued at US\$601 600, while imports of other sharks were 1 100 tonnes, worth US\$3.3 million. The great bulk of imports were fresh of which 1 500 tonnes, valued at US\$556 000, were dogfish from Canada and 950 tonnes, worth US\$2.2 million, were other sharks. Suppliers for these other sharks were Mexico with 414 tonnes, worth US\$430 000, Ecuador with 130 tonnes, valued at US\$451 000, Canada with 120 tonnes, worth US\$293 600 and other countries of Central and South America. Imports of frozen sharks were only 170 tonnes, worth US\$1.2 million, of which 21 tonnes were dogfish from Canada and the rest other sharks mainly from Spain, Peru, Nicaragua, Mexico and Hong Kong.

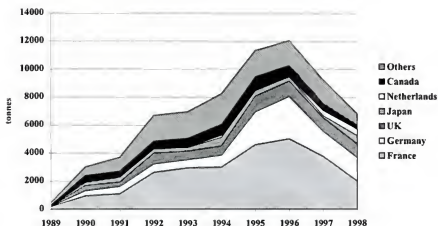
Figure 60 US imports of fresh and frozen sharks in tonnes



Source: NMFS.

In 1989 US exports amounted to 517 tonnes, worth US\$1.1 million. In the following years exports increased considerably to peak at nearly 12 100 tonnes, worth US\$33.4 million, in 1996. In the following two years US exports have declined substantially to reach 6 850 tonnes, valued at US\$19.0 million, in 1998. In 1989 78.0% of the exports were frozen; by 1998 this percentage has reduced to 47.0%. The great bulk of exports, 90.8%, was composed of dogfish, of which 3 110 tonnes, worth US\$10.5 million, were fresh and 3 120 tonnes, valued at US\$7.5 million were frozen. In 1998 Europe represented the major destination area, taking 80.5% of total US shark exports. France was by far the leading country, receiving 29.4% of total volume of US exports, followed by Germany, UK, Japan, the Netherlands and Canada. The USA usually exports backs to Europe, in particular to France and UK. This product represents 28-30% of the total body weight. Bellies account for another 7% of the round weight and are exported to Germany where they are smoked and used to prepare the German speciality called *Schillerlocken*. The European market usually prefers larger dogfish.

Figure 61 US imports of fresh and frozen sharks in tonnes



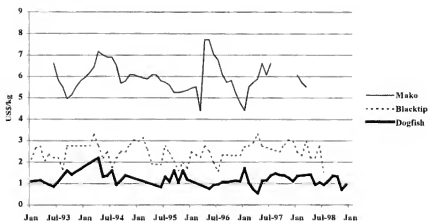
Source: NMFS

Of the species harvested commercially in the USA, the following are preferred for meat and fillets: mako, common thresher, Pacific angel shark, soupfin, bonito, blacktip and sandbar. Shortfin mako is preferred for meat due to its similarity to swordfish and obtains higher prices than other species. Rays and dogfish are considered less valuable compared with mako and thresher sharks. Much of the imports are dogfish, mainly from Canada, which are processed for re-export. Imports of other sharks consist mainly of pelagic species, with mako, thresher sharks and porbeagles preferred. These species are preferred to dogfish and they are usually marketed to restaurants. Domestic landings of species such as sandbar and blacktip or other coastal sharks are mainly employed for home consumption and are commercialised in supermarkets.

A plus for the US market is that sharks have no bones. Steaks and fillets are baked, fried, barbecued, broiled, poached, steamed, blackened or chunked for kebabs. Fresh and frozen shark steaks and fillets are commonly offered in supermarkets. The steak form continues to be the most popular. Picked dogfish, called spiny dogfish in the USA, has been marketed under the name steakfish. At the beginning shark was marketed as gray fish in the USA but, after they became more acceptable, they were called cape shark or simply, shark.

In February 1999, at the Fulton fish market of New York, the wholesale price for fresh whole blacktip ranged between US\$1.76/kg and US\$1.87/kg, according to quality; the wholesale price for fresh thresher varied between US\$1.30/kg and US\$1.45/kg and that for dogfish ranged between US\$0.88/kg and US\$1.00/kg. In April 1999, at Miami, c&f prices for thresher shark from Costa Rica were US\$2.18/kg for H&G, chilled, air-flown, US\$3.26/kg for skin-on loins and US\$3.35/kg for skin-off loins. Figure 3 shows three price series for fresh mako shark, blacktip shark and dogfish at the Fulton fish market in NY from January 1994 to December 1998.

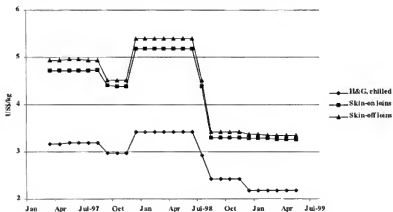
Figure 62 Fulton fish market NY average prices in US\$/kg



Source: NMFS.

Figure 63 displays three c&f price series for thresher shark as chilled, skin-on and skin-off loins in Miami, origin Costa Rica from March 1997 to May 1999.

Figure 63 Fulton fish market NY average prices for thresher shark in US\$/kg



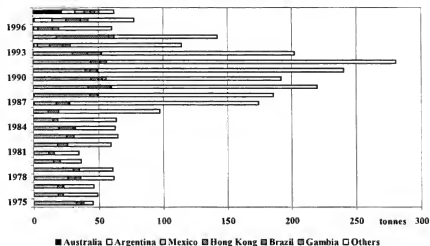
Source: INFOFISH Trade News.

In 1998 US exports of shark fins were recorded for the first time at 146 tonnes, worth US\$1.3 million, of which 6 tonnes, valued US\$43 500, were re-exports to Hong Kong. This latter imported 95.8% of the volume and 98.3% of the value of total US exports of shark fins and the rest went to Japan and China. In the previous years, according to their national

statistics, other outlets for US shark fins were Singapore, Thailand, Malaysia and Indonesia. The USA began to increase its production and exports of shark fins in the late 1970s, with considerable expansion in the following decades. Increasing Asian demand for shark fin, including the opening of China in the mid-1980s, has also contributed to a significant increase in world shark fin prices which has led to a growth in the number of entrepreneurs in the trade. US processors usually dry or freeze fins whole and export them to Hong Kong and Singapore for further processing. They are then re-imported as fully processed products. Fins of picked dogfish are often processed, yet they are internationally considered of rather lower value than fins from other species. Hammerheads and sandbar shark are considered to be better quality, followed by those from tiger, blacktip, dusky, bull and silky sharks. Fins of better quality are exported to Hong Kong and Singapore.

US imports of dried shark fins have increased considerably recently. In 1975 they were at 45 tonnes, worth US\$282 500, with Mexico supplying 71.8% of the total imports. There has been a spectacular increase since the second half of the 1980s. Imports increased steadily from 63 in 1984 peaking at nearly 280 tonnes, worth US\$8.4 million, in 1992. Following this they declined, with the exceptions of 1995 and 1997, to 62 tonnes, valued US\$1.7 million in 1998. In 1998 major suppliers were Australia, Argentina, Mexico, Hong Kong, Brazil, Gambia, Guatemala and Canada, with countries of Central and Latin America supplying 43.4% of total US imports of shark fins. In 1998 imports from Australia have grown from 1 tonne in 1997 to 22 tonnes. In the previous years other major exporters of shark fins to the USA were Venezuela, Japan, Costa Rica, Ecuador, Guyana, Taiwan Province of China and Panama.

Figure 64 US Imports of shark fins in tonnes, 1975-1998



Source: NMFS.

There is also an expanding domestic market for shark fins due to the sizeable Chinese population, mainly in urban areas on the East and West coasts such as San Francisco, Los Angeles and New York. Shark fins imported from Asian countries such as Hong Kong, Korea and Taiwan Province of China consist mainly of dried or processed fins, fin nets or canned shark fin soup. These products are sold in ethnic shops and centres and in restaurants. In September 1998 various shops in China Town in San Francisco were selling the cheapest fins at prices around US\$16-18/kg for small fins, unskinned dorsals from species such as blue sharks and small blacktips. Larger fins from tiger sharks, oceanic whitetips and great hammerheads cost US\$70-90/kg. Dried common thresher shark tails were sold at US\$1 000 per tail. Other fins cured, dried and skinned cost as much as US\$140/kg. Giant unskinned fins, probably of basking sharks, cost US\$3 000 each. Processed versions of these giant fins, cured and skinned, were marketed at US\$5 000.

A remarkable market for shark skin leather has developed in the USA. Dogfish hide was used in pre-industrial times for sandpaper. Shark leather was of great interest to the leather industry and shark hides to the tanning industry¹¹⁷. The US Company "Ocean Leather Corporation" monopolised the world production of shark leather for decades since 1925, handling around 50 000 shark skins annually in the mid-1980s. Now it no longer exists and only one tannery uses shark skins, along with other skins, for the production of exotic leathers. Once shark leather was mainly used for cowboy boots in Texas and also for small leather goods like watchstraps and belts. The manufacture of these boots is now marginal due to a decline in popularity. With the growing economic importance of shark meat in the USA, the use of shark skin for the production of leather has become less profitable and interesting. Sharks are usually sold as headed or headed and gutted carcasses, with the skin intact in order to protect the meat and avoid oxidation. Furthermore, sharks have to be immediately bled, dressed and iced after they are caught to prevent urea from contaminating the meat, but exposure to fresh water or to ice usually damages shark skins. Shark skins are more often imported, with Mexico as the major supplier. Unfortunately shark skin has not been identified with its own commodity code in US statistics since 1989, when US imports were the highest recorded at 36 800 skins, in large part from Mexico. Data on the effective actual volume of this trade is not available.

From 1930-50 shark oil was used in the production of vitamin A, with tope as the preferred species, but this manufacture ended when vitamin A was synthesised in the 1950s. Nowadays, there is a limited production of shark liver oil capsules, which is directed more at external markets than the domestic one. Yet, shark liver oil is now being promoted and sold as a cure for cancer in the same way as cartilage, albeit on a slightly smaller scale, and also as a cure for arthritis, psoriasis and many other ailments. One of the uses of liver oil is as an ingredient in Preparation H, an over-the-counter haemorrhoid ointment produced in the USA and distributed internationally¹¹⁸. Shark liver oil has been used for the tanning and curing of leather. Squalene is used in pharmaceuticals and cosmetic products such as skin creams. A 2 oz¹¹⁹ cream made with shark liver oil and shark cartilage is sold at US\$24.95. A 4 oz purifying squalene mask against acne is marketed at US\$28.00. Import statistics for shark liver oil are available from 1972 to 1988, but they were rather limited, totaling 103 730 kg over the whole period.

¹¹⁷ KREUZER R., AHMED R., *idem*.

¹¹⁸ ROSE D.A., *idem*, 1998.

¹¹⁹ 1 oz (ounce) = 28g

The USA represents one of the major producing country of products such as powder, creams and capsules manufactured from the cartilage of sharks. These products are sold on the domestic market and pre-packaged cartilage products are marketed and exported to about 35 countries under a variety of brand names. These products have been claimed to be beneficial in a great variety of diseases: arthritis, psoriasis colitis, acne, enteritis, phlebitis, rheumatism, peptic ulcers, haemorrhoids, herpes simplex, melanoma, recently also AIDS and, above all, cancer. Shark resistance to cancer has created a new market for shark cartilage as an alternative medicine, even though its benefits are unproved. Shark cartilage is considered beneficial in inhibiting the growth of tumours by impeding the vascularization of malignant tissues (angiogenesis). At the present time, the FDA classifies shark cartilage as a dietary food supplement.

There are different ranges of retail prices according to the products and brands:

- From US\$21.95 for 100 capsules to US\$46.95 for 90 capsules
- US\$125.00 for 500g of shark cartilage powder
- US\$108.00 for 740mg of shark cartilage caplets
- US\$335.00 for 1 400g of vanilla flavoured shark cartilage powder
- US\$100.00 for 400g of shark cartilage supplement for pets
- US\$80.00 for 50 piece box of shark cartilage supplement for horses

Products such as jaws, teeth and fossil teeth are usually sold in local curio trades, especially in coastal tourist areas.

Table 24 US elasmobranch catches by species in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Dogfish sharks nei | 1 945 | 1 499 | 1 850 | 1 405 | 1 158 | 1 109 | 1 108 | 1 614 | 2 932 | 2 524 |
| Raja rays nei | 73 | 184 | 95 | 92 | 54 | 47 | 38 | 52 | 42 | 57 |
| Sharks, rays, skates, etc. nei | 48 | 397 | 163 | 216 | 367 | 272 | 503 | 345 | 232 | 289 |
| Rays, stingrays, mantas nei | 547 | 677 | 1 150 | 1 422 | 1 343 | 1 317 | 1 690 | 1 835 | 1 163 | 1 608 |
| Large sharks nei | - | - | - | - | - | - | - | - | - | - |
| Blacktip shark | - | - | - | - | - | - | - | - | - | - |
| Longfin mako | - | - | - | - | - | - | - | - | - | - |
| Nurse sharks nei | - | - | - | - | - | - | - | - | - | - |
| Picked dogfish | - | - | - | - | - | - | - | - | - | - |
| Shortfin mako | - | - | - | - | - | - | - | - | - | - |
| Sandbar shark | - | - | - | - | - | - | - | - | - | - |
| Thresher | - | - | - | - | - | - | - | - | - | - |
| Dusky shark | - | - | - | - | - | - | - | - | - | - |
| Mackerel sharks, porbeagles nei | - | - | - | - | - | - | - | - | - | - |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Total | 2 613 | 2 757 | 3 258 | 3 135 | 2 922 | 2 745 | 3 339 | 3 846 | 4 369 | 4 478 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Dogfish sharks nei | 1 549 | 1 105 | 931 | 1 065 | 1 607 | 1 479 | 1 372 | 891 | 511 | 464 |
| Raja rays nei | 61 | 36 | 45 | 43 | 47 | 68 | 44 | 86 | 48 | 65 |
| Sharks, rays, skates, etc. nei | 330 | 606 | 367 | 322 | 310 | 313 | 347 | 872 | 251 | 240 |
| Rays, stingrays, mantas nei | 855 | 1 071 | 1 060 | 926 | 1 084 | 1 000 | 979 | 765 | 790 | 762 |
| Large sharks nei | - | - | - | - | - | - | - | - | - | - |
| Blacktip shark | - | - | - | - | - | - | - | - | - | - |
| Longfin mako | - | - | - | - | - | - | - | - | - | - |
| Nurse sharks nei | - | - | - | - | - | - | - | - | - | - |
| Picked dogfish | - | - | - | - | - | - | - | - | - | - |
| Shortfin mako | - | - | - | - | - | - | - | - | - | - |
| Sandbar shark | - | - | - | - | - | - | - | - | - | - |
| Thresher | - | - | - | - | - | - | - | - | - | - |
| Dusky shark | - | - | - | - | - | - | - | - | - | - |
| Mackerel sharks, porbeagles nei | - | - | - | - | - | - | - | - | - | - |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Total | 2 795 | 2 818 | 2 403 | 2 356 | 3 048 | 2 860 | 2 742 | 2 614 | 1 600 | 1 531 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Dogfish sharks nei | 500 | 100 | - | - | 994 | 668 | 3 210 | 3 147 | 3 523 | 8 771 |
| Raja rays nei | 100 | 100 | 100 | 100 | 96 | 147 | 55 | 171 | 351 | 66 |
| Sharks, rays, skates, etc. nei | 200 | 200 | 200 | 400 | 246 | 273 | 458 | 486 | 800 | 1 435 |
| Rays, stingrays, mantas nei | 100 | - | - | - | 69 | 70 | 192 | 15 | 249 | 245 |
| Large sharks nei | 800 | 1 100 | 700 | 1 300 | 836 | 559 | 140 | 906 | 957 | 541 |
| Blacktip shark | - | - | - | - | - | - | - | - | - | - |
| Longfin mako | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nurse sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Picked dogfish | - | - | - | - | - | - | - | - | - | - |

Table 24 US elasmobranch catches by species in tonnes (continued)

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Shortfin mako | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sandbar shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Thresher | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dusky shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mackerel sharks, porbeagles nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Porbeagle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1 700 | 1 500 | 1 000 | 1 800 | 2 241 | 1 717 | 4 055 | 4 725 | 5 880 | 11 058 |
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Dogfish sharks nei | 7 601 | 8 343 | 8 807 | 6 567 | 2 754 | 5 247 | 5 041 | 6 428 | 4 568 | 5 808 |
| Raja rays nei | 684 | 297 | 231 | 3 411 | 4 099 | 3 930 | 4 190 | 5 035 | 5 798 | 6 642 |
| Sharks, rays, skates, etc. nei | 1 772 | 1 944 | 2 161 | 1 998 | 2 180 | 2 392 | 2 522 | 3 222 | 6 195 | 7 432 |
| Rays, stingrays, mantas nei | 901 | 140 | 337 | 294 | 178 | 178 | 171 | 267 | 185 | 206 |
| Large sharks nei | 263 | 272 | 172 | 123 | 127 | 159 | 167 | 232 | 365 | 324 |
| Blacktip shark | - | - | - | - | 0 | 0 | 0 | 0 | 0 | 0 |
| Longfin mako | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Nurse sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Picked dogfish | - | - | - | - | - | - | - | - | - | - |
| Shortfin mako | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 2 | 7 |
| Sandbar shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Thresher | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 21 | 17 |
| Dusky shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| Mackerel sharks, porbeagles nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Porbeagle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 32 | 3 |
| Total | 11 221 | 10 996 | 11 708 | 12 393 | 9 338 | 11 906 | 12 092 | 15 204 | 17 169 | 20 445 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Dogfish sharks nei | 16 236 | 15 606 | 19 200 | 22 764 | 21 242 | 23 904 | 29 638 | 21 021 | | |
| Raja rays nei | 11 342 | 11 212 | 12 473 | 8 103 | 8 846 | 6 454 | 13 891 | 10 142 | | |
| Sharks, rays, skates, etc. nei | 6 352 | 4 887 | 6 228 | 5 088 | 6 331 | 4 947 | 3 643 | 5 689 | | |
| Rays, stingrays, mantas nei | 204 | 2 958 | 14 779 | 168 | 48 | 430 | 1 554 | 2 488 | | |
| Large sharks nei | 320 | 699 | 1 100 | 1 773 | 1 071 | 1 470 | 3 317 | 1 083 | | |
| Blacktip shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | |
| Longfin mako | 1 | 5 | 12 | - | 5 | - | 0 | 1 | | |
| Nurse sharks nei | 0 | 0 | 0 | 0 | - | 214 | - | - | | |
| Picked dogfish | - | - | - | - | - | 128 | - | - | | |
| Shortfin mako | 19 | 64 | 59 | 71 | 66 | 5 | - | - | | |
| Sandbar shark | 0 | 0 | 55 | 31 | 24 | 1 | - | - | | |
| Thresher | 12 | 16 | 105 | 14 | 23 | 1 | - | - | | |
| Dusky shark | 70 | 47 | 69 | 23 | 20 | - | - | - | | |
| Mackerel sharks, porbeagles nei | 1 | - | - | - | 49 | - | - | - | | |
| Porbeagle | 19 | 16 | 13 | 39 | 64 | - | - | - | | |
| Total | 34 576 | 35 510 | 54 093 | 38 074 | 37 789 | 37 554 | 52 043 | 40 425 | | |

Source: FAO - FIDI.

Table 25 US elasmobranch catches by fishing areas in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Atlantic, Northwest | 499 | 502 | 390 | 390 | 282 | 278 | 428 | 811 | 1 024 | 1 150 |
| Atlantic, Western Central | 26 | 12 | 19 | 6 | 6 | 10 | 10 | 6 | 7 | 14 |
| Pacific, Eastern Central | 70 | 420 | 201 | 393 | 411 | 338 | 576 | 412 | 315 | 382 |
| Pacific, Northeast | 2 018 | 1 823 | 2 648 | 2 346 | 2 223 | 2 119 | 2 325 | 2 617 | 3 023 | 2 932 |
| Total | 2 613 | 2 757 | 3 258 | 3 135 | 2 922 | 2 745 | 3 339 | 3 846 | 4 369 | 4 478 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Atlantic, Northwest | 963 | 760 | 625 | 715 | 821 | 602 | 658 | 408 | 231 | 232 |
| Atlantic, Western Central | 14 | 323 | 21 | 20 | 16 | 18 | 43 | 601 | 48 | 17 |
| Pacific, Eastern Central | 382 | 464 | 425 | 400 | 394 | 364 | 367 | 357 | 283 | 256 |
| Pacific, Northeast | 1 436 | 1 271 | 1 332 | 1 221 | 1 817 | 1 876 | 1 674 | 1 248 | 1 038 | 1 026 |
| Total | 2 795 | 2 818 | 2 403 | 2 356 | 3 048 | 2 860 | 2 742 | 2 614 | 1 600 | 1 531 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Atlantic, Northwest | 900 | 1 200 | 800 | 1 400 | 1 059 | 853 | 745 | 1 961 | 2 147 | 5 292 |
| Atlantic, Western Central | - | - | - | 200 | 24 | 34 | 81 | 122 | 152 | 70 |
| Pacific, Eastern Central | 200 | 200 | 200 | 200 | 241 | 267 | 429 | 379 | 724 | 1 381 |
| Pacific, Northeast | 600 | 100 | - | - | 917 | 563 | 2 800 | 2 263 | 2 857 | 4 315 |
| Total | 1 700 | 1 500 | 1 000 | 1 800 | 2 241 | 1 717 | 4 055 | 4 725 | 5 880 | 11 058 |
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Atlantic, Northwest | 5 070 | 6 721 | 7 132 | 8 299 | 5 032 | 8 048 | 7 062 | 8 025 | 9 189 | 11 476 |
| Atlantic, Western Central | 203 | 398 | 418 | 600 | 728 | 818 | 1 054 | 1 910 | 5 361 | 6 806 |
| Pacific, Eastern Central | 1 538 | 1 360 | 1 783 | 1 440 | 1 489 | 1 604 | 1 193 | 1 196 | 831 | 681 |
| Pacific, Northeast | 4 410 | 2 517 | 2 375 | 2 054 | 2 089 | 1 436 | 2 783 | 4 073 | 1 788 | 1 482 |
| Total | 11 221 | 10 996 | 11 708 | 12 393 | 9 338 | 11 906 | 12 092 | 15 204 | 17 169 | 20 445 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Atlantic, Northwest | 26 622 | 25 393 | 31 054 | 30 858 | 24 608 | 30 850 | 44 655 | 31 311 | | |
| Atlantic, Western Central | 5 589 | 4 083 | 4 631 | 3 582 | 9 612 | 3 497 | 1 228 | 3 126 | | |
| Pacific, Eastern Central | 816 | 686 | 652 | 1 475 | 1 214 | 1 527 | 2 753 | 3 176 | | |
| Pacific, Northeast | 1 549 | 5 348 | 17 756 | 2 159 | 2 355 | 1 680 | 3 407 | 2 812 | | |
| Total | 34 576 | 35 510 | 54 093 | 38 074 | 37 789 | 37 554 | 52 043 | 40 425 | | |

Source: FAO - FIDI.

Table 26 US shark production by product type in tonnes

| Year | Frozen | Fresh/chilled fillets | Frozen fillets | Total |
|-------------|---------------|------------------------------|-----------------------|--------------|
| 1978 | - | 1 087 | - | 1 087 |
| 1979 | - | 1 275 | 2 011 | 3 286 |
| 1980 | - | 1 148 | 2 003 | 3 151 |
| 1981 | - | 7 | 946 | 953 |
| 1982 | - | 228 | 2 997 | 3 225 |
| 1983 | - | 84 | 2 408 | 2 492 |
| 1984 | - | 311 | 3 144 | 3 455 |
| 1985 | - | 523 | 2 398 | 2 921 |
| 1986 | - | 928 | 1 112 | 2 040 |
| 1987 | - | 3 786 | 703 | 4 489 |
| 1988 | - | 396 | 2 017 | 2 413 |
| 1989 | 403 | 1 068 | 1 518 | 2 989 |
| 1990 | 1 900 | 2 857 | 1 886 | 6 643 |
| 1991 | 2 745 | 1 754 | 2 409 | 6 908 |
| 1992 | 4 733 | 1 591 | 6 637 | 12 961 |
| 1993 | 3 097 | 1 260 | 6 948 | 11 305 |
| 1994 | 3 646 | 898 | 7 645 | 12 189 |
| 1995 | 7 032 | 853 | 7 088 | 14 973 |
| 1996 | 7 206 | 854 | 4 688 | 12 748 |
| 1997 | 4 725 | 2 537 | 2 907 | 10 169 |

Source: FAO – FIDI.

Table 27 US imports of fresh and chilled sharks by country in tonnes

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Canada | 1 491 | 1 721 | 1 380 | 1 031 | 581 | 1 259 | 1 922 | 2 130 | 1 610 | 1 626 |
| Mexico | 237 | 176 | 228 | 461 | 619 | 681 | 362 | 415 | 365 | 414 |
| Ecuador | 151 | 301 | 410 | 341 | 177 | 409 | 369 | 530 | 351 | 129 |
| Costa Rica | 393 | 410 | 420 | 356 | 370 | 282 | 340 | 180 | 118 | 110 |
| Nicaragua | - | - | - | 2 | - | 56 | 1 | 5 | 14 | 75 |
| Chile | 11 | 38 | 8 | - | 16 | 8 | 39 | 63 | 114 | 66 |
| Peru | 1 | - | - | 2 | - | 17 | 1 | 0 | 1 | 11 |
| Trinidad & Tobago | 2 | 0 | 2 | - | - | 3 | 0 | 0 | 1 | 9 |
| El Salvador | - | - | 1 | - | 1 | - | 0 | 4 | 2 | 8 |
| Uruguay | - | - | - | - | - | 7 | 1 | 1 | 1 | 1 |
| Taiwan PC | - | - | - | - | - | - | - | - | - | 1 |
| Venezuela | - | 5 | 4 | - | 0 | 3 | 0 | 1 | 0 | 0 |
| Portugal | - | - | - | - | - | - | 5 | 0 | 2 | - |
| Barbados | - | 0 | - | - | - | - | 0 | 0 | 1 | - |
| Panama | - | - | - | - | - | 1 | 10 | 1 | 0 | - |
| Iceland | - | - | - | - | - | - | 0 | 1 | 0 | - |
| Bahamas | - | - | - | - | 18 | - | - | - | - | - |
| Brazil | - | - | - | - | 1 | 2 | - | - | - | - |
| Christmas Island | - | - | - | 0 | - | - | - | - | - | - |
| Colombia | - | - | 1 | 1 | 3 | - | - | - | - | - |
| Dominican Rep. | - | 1 | - | - | - | - | - | - | - | - |
| Guatemala | - | - | 1 | 5 | - | - | - | - | - | - |
| Honduras | - | - | - | - | 2 | - | - | - | - | - |
| Hong Kong | - | - | 0 | - | - | - | - | - | - | - |
| Italy | - | 0 | - | - | - | - | - | - | - | - |
| Jamaica | - | 1 | - | - | - | - | - | - | - | - |
| Korea Rep. | - | - | - | - | 38 | - | - | - | - | - |
| St.Vincent-Grenadines | - | - | - | 1 | - | - | - | - | - | - |
| Switzerland | 0 | - | - | - | - | - | - | - | - | - |
| Total | 2 286 | 2 653 | 2 455 | 2 199 | 1 826 | 2 728 | 3 051 | 3 331 | 2 581 | 2 452 |

Source: NMFS.

Table 28 US imports of fresh and chilled sharks by country in US\$ 1 000

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Canada | 594 | 601 | 531 | 433 | 381 | 802 | 1 029 | 885 | 1 087 | 850 |
| Ecuador | 405 | 862 | 1 049 | 932 | 528 | 1 308 | 1 376 | 1 979 | 1 261 | 451 |
| Mexico | 462 | 335 | 541 | 913 | 1 190 | 1 161 | 606 | 568 | 396 | 430 |
| Costa Rica | 1 311 | 1 327 | 1 023 | 939 | 1 293 | 995 | 1 109 | 471 | 327 | 306 |
| Nicaragua | - | - | - | 5 | - | 138 | 3 | 40 | 35 | 281 |
| Chile | 37 | 158 | 39 | - | 57 | 26 | 136 | 212 | 435 | 263 |
| Trinidad & Tobago | 10 | 1 | 6 | - | - | 4 | - | - | 7 | 49 |
| Peru | 1 | - | - | 3 | - | 38 | 6 | - | 5 | 40 |
| El Salvador | - | - | 2 | - | 2 | - | - | 18 | 6 | 33 |
| Taiwan PC | - | - | - | - | - | - | - | - | - | 8 |
| Uruguay | - | - | - | - | - | 13 | 6 | 4 | 3 | 5 |
| Venezuela | - | 19 | 11 | - | 11 | 12 | 2 | 7 | 3 | 2 |
| Portugal | - | - | - | - | - | - | 17 | - | 5 | - |
| Barbados | - | 3 | - | - | - | - | - | - | 2 | - |
| Iceland | - | - | - | - | - | - | - | 4 | - | - |
| Panama | - | - | - | - | - | 3 | 19 | 2 | - | - |
| Jamaica | - | 15 | - | - | - | - | - | 2 | - | - |
| Bahamas | - | - | - | - | 41 | - | - | - | - | - |
| Brazil | - | - | - | - | 1 | 3 | - | - | - | - |
| Christmas Island | - | - | - | 3 | - | - | - | - | - | - |
| Colombia | - | - | 3 | 4 | 11 | - | - | - | - | - |
| Dominican Rep. | - | 4 | - | - | - | - | - | - | - | - |
| Guatemala | - | - | 2 | 11 | - | - | - | - | - | - |
| Honduras | - | - | - | - | 4 | - | - | - | - | - |
| Hong Kong | - | - | 3 | - | - | - | - | - | - | - |
| Italy | - | 1 | - | - | - | - | - | - | - | - |
| Korea Rep. | - | - | - | - | 10 | - | - | - | - | - |
| St.Vincent-Grenadines | - | - | - | 3 | - | - | - | - | - | - |
| Switzerland | 4 | - | - | - | - | - | - | - | - | - |
| Total | 2 823 | 3 327 | 3 209 | 3 246 | 3 529 | 4 502 | 4 308 | 4 191 | 3 571 | 2 717 |

Source: NMFS.

Table 29 US imports of frozen sharks by country in tonnes

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------|------------|------------|------------|-----------|------------|------------|-----------|-----------|-----------|------------|
| Spain | - | 1 | - | 1 | - | - | - | 2 | 20 | 116 |
| Canada | 17 | 33 | 47 | 33 | 53 | 93 | 31 | 15 | 13 | 22 |
| Peru | - | 10 | - | - | - | 6 | - | - | 2 | 20 |
| Nicaragua | - | - | 1 | 7 | - | 5 | - | - | - | 7 |
| Mexico | 44 | - | 5 | - | - | - | 2 | 11 | 2 | 3 |
| Hong Kong | 91 | 19 | - | 1 | 0 | 2 | - | 5 | 9 | 1 |
| New Zealand | - | - | - | - | - | - | - | - | - | 0 |
| Fiji | - | - | - | - | - | - | - | - | - | 0 |
| Singapore | - | - | 1 | - | - | - | - | - | - | 0 |
| Thailand | - | - | 1 | - | - | - | - | - | - | 0 |
| Chile | 13 | 2 | - | - | 33 | 13 | 1 | - | 8 | - |
| Costa Rica | - | - | 22 | 0 | 0 | 36 | - | - | 3 | - |
| Turks & Caicos Islands | - | - | - | - | - | - | - | - | 2 | - |
| Japan | 3 | 1 | 0 | - | - | 3 | 4 | 2 | 1 | - |
| Trinidad & Tobago | 0 | 13 | 19 | 0 | - | - | - | - | 1 | - |
| Ecuador | - | 17 | 20 | - | 13 | - | 14 | - | - | - |
| UK | 15 | - | - | - | - | - | 9 | - | - | - |
| Philippines | 13 | - | - | - | - | - | 8 | - | - | - |
| Argentina | - | - | - | - | 2 | - | - | - | - | - |
| Bangladesh | - | - | - | 0 | - | - | - | - | - | - |
| Guyana | - | - | - | 0 | - | 0 | - | - | - | - |
| Honduras | - | - | - | - | - | 3 | - | - | - | - |
| India | - | - | 5 | 6 | - | - | - | - | - | - |
| Malaysia | - | - | - | 0 | - | - | - | - | - | - |
| Morocco | - | - | - | - | 0 | - | - | - | - | - |
| Netherland Antilles | - | - | 1 | - | - | - | - | - | - | - |
| Portugal | 3 | 3 | 1 | 9 | 5 | 4 | - | - | - | - |
| Taiwan PC | - | - | - | 1 | - | - | - | - | - | - |
| Uruguay | 1 | - | - | - | - | - | - | - | - | - |
| Venezuela | - | - | - | 1 | 4 | - | - | - | - | - |
| Total | 200 | 100 | 123 | 60 | 110 | 166 | 69 | 35 | 62 | 169 |

Source: NMFS

Table 30 US imports of frozen sharks by country in US\$ 1 000

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| Spain | - | 3 | - | 60 | - | - | - | 4 | 220 | 976 |
| Canada | 29 | 48 | 81 | 62 | 134 | 353 | 500 | 114 | 45 | 48 |
| Peru | - | 24 | - | - | - | 32 | - | - | 12 | 38 |
| New Zealand | - | - | - | - | - | - | - | - | - | 31 |
| Nicaragua | - | - | 3 | 20 | - | 15 | - | - | 2 | 23 |
| Hong Kong | 485 | 92 | - | 7 | 43 | 24 | 4 | 312 | 546 | 21 |
| Singapore | - | - | 4 | - | - | - | - | - | - | 18 |
| Fiji | - | - | - | - | - | - | - | - | - | 12 |
| Mexico | 36 | - | 15 | - | - | - | 1 | 8 | 18 | 3 |
| Thailand | - | - | 3 | - | - | - | - | - | - | 2 |
| Japan | 10 | 4 | 2 | - | - | 18 | 190 | 126 | 38 | - |
| Chile | 35 | 6 | - | - | 92 | 24 | 2 | - | 34 | - |
| Costa Rica | - | - | 53 | 5 | 2 | 166 | - | - | 8 | - |
| Turks & Caicos Is. | - | - | - | - | - | - | - | - | 4 | - |
| Trinidad & Tobago | 1 | 57 | 67 | - | - | - | - | - | 3 | - |
| Ecuador | - | 35 | 47 | - | 28 | - | 16 | 1 | 2 | - |
| Honduras | - | - | - | - | - | 3 | - | 5 | - | - |
| UK | 43 | - | - | - | - | - | 49 | - | - | - |
| Philippines | 42 | - | - | - | - | - | 26 | - | - | - |
| Argentina | - | - | - | - | 2 | - | - | - | - | - |
| Bangladesh | - | - | - | 2 | - | - | - | - | - | - |
| Guyana | - | - | - | 6 | - | 2 | - | - | - | - |
| India | - | - | 6 | 4 | - | - | - | - | - | - |
| Malaysia | - | - | - | 12 | - | - | - | - | - | - |
| Morocco | - | - | - | - | 1 | - | - | - | - | - |
| Netherland Antilles | - | - | 2 | - | - | - | - | - | - | - |
| Portugal | 5 | 6 | 2 | 21 | 10 | 13 | - | - | - | - |
| Taiwan PC | - | - | - | 2 | - | - | - | - | - | - |
| Uruguay | 2 | - | - | - | - | - | - | - | - | - |
| Venezuela | - | - | - | 3 | 50 | - | - | - | - | - |
| Total | 689 | 274 | 285 | 205 | 361 | 649 | 788 | 570 | 931 | 1 172 |

Source: NMFS.

Table 31 US exports of fresh sharks by country in tonnes

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------------|------------|--------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| France | - | 107 | 155 | 587 | 1 760 | 2 049 | 2 606 | 2 819 | 1 936 | 1 215 |
| Germany | - | 110 | 45 | 19 | 96 | 245 | 256 | 753 | 546 | 548 |
| UK | - | 61 | 159 | 332 | 152 | 352 | 382 | 273 | 592 | 513 |
| Netherlands | - | 0 | - | 7 | 23 | 144 | 13 | 4 | 359 | 458 |
| Canada | 9 | 497 | 418 | 525 | 657 | 767 | 641 | 502 | 483 | 274 |
| Mexico | 26 | 0 | 2 | 134 | 386 | 262 | 33 | 32 | 54 | 176 |
| Hong Kong | 43 | 5 | 12 | 15 | - | 61 | 24 | 3 | 33 | 143 |
| Belgium | - | - | 36 | 152 | 146 | 342 | 154 | 260 | 128 | 112 |
| Japan | - | 18 | 16 | 20 | 33 | 74 | 97 | 86 | 51 | 86 |
| Italy | - | 18 | 39 | 0 | 92 | 145 | 26 | 34 | 89 | 86 |
| Svalbard-Jan Mayen | - | - | - | - | - | - | - | - | 46 | 12 |
| Brazil | - | - | - | - | - | - | - | - | - | 5 |
| New Zealand | - | - | - | - | - | - | - | - | - | 3 |
| Czech Rep. | - | - | - | - | - | - | - | - | 3 | 2 |
| Thailand | 35 | 311 | 82 | 134 | 219 | 95 | 29 | - | 157 | - |
| Spain | - | 1 | - | 18 | 7 | - | - | 21 | 16 | - |
| Greece | - | - | - | 38 | 308 | 65 | 65 | 63 | 15 | - |
| Singapore | - | - | - | - | - | - | - | - | 3 | - |
| Switzerland | - | - | - | - | - | 3 | - | - | 1 | - |
| Taiwan PC | - | - | - | - | - | - | - | 7 | 1 | - |
| Australia | - | - | - | - | - | - | - | - | 0 | - |
| Korea Rep. | - | - | - | - | - | - | 1 | 1 | 0 | - |
| Portugal | - | - | - | - | - | 19 | - | - | - | - |
| Luxembourg | - | - | - | - | - | 4 | - | - | - | - |
| Sweden | - | - | - | - | - | 2 | - | - | - | - |
| Turkey | - | - | - | 3 | 2 | 0 | - | - | - | - |
| Denmark | - | - | - | - | 2 | - | - | - | - | - |
| Total | 114 | 1 129 | 963 | 1 983 | 3 883 | 4 632 | 4 327 | 4 858 | 4 515 | 3 634 |

Source: NMFS

Table 32 US exports of fresh sharks by country in US\$ 1 000

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------------|------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|
| France | - | 194 | 254 | 2 030 | 5 646 | 5 708 | 8 504 | 9 180 | 5 026 | 4 005 |
| Netherlands | - | 3 | - | 28 | 95 | 516 | 46 | 14 | 1 202 | 1 854 |
| UK | - | 128 | 530 | 1 182 | 508 | 887 | 1 208 | 917 | 1 724 | 1 793 |
| Germany | - | 311 | 123 | 42 | 182 | 962 | 1 066 | 1 957 | 1 712 | 1 533 |
| Canada | 20 | 673 | 706 | 845 | 1 001 | 1 776 | 1 289 | 872 | 991 | 471 |
| Italy | - | 32 | 79 | - | 156 | 273 | 39 | 101 | 340 | 375 |
| Belgium | - | - | 119 | 485 | 409 | 850 | 532 | 731 | 292 | 357 |
| Hong Kong | 112 | 11 | 60 | 35 | 0 | 67 | 133 | 6 | 172 | 356 |
| Japan | - | 26 | 52 | 45 | 74 | 221 | 440 | 366 | 222 | 293 |
| Mexico | 19 | - | 5 | 130 | 362 | 461 | 58 | 58 | 59 | 159 |
| Svalbard-Jan Mayen | - | - | - | - | - | - | - | - | 300 | 50 |
| Brazil | - | - | - | - | - | - | - | - | - | 15 |
| New Zealand | - | - | - | - | - | - | - | - | - | 7 |
| Czech Rep. | - | - | - | - | - | - | - | - | 7 | 3 |
| Thailand | 166 | 690 | 343 | 766 | 884 | 568 | 212 | 0 | 557 | - |
| Spain | - | 4 | - | 29 | 15 | 0 | 0 | 102 | 88 | - |
| Greece | - | - | - | 55 | 513 | 124 | 81 | 89 | 22 | - |
| Singapore | - | - | - | - | - | - | - | - | 7 | - |
| Taiwan PC | - | - | - | - | - | - | - | 15 | 7 | - |
| Switzerland | - | - | - | - | - | 6 | - | - | 3 | - |
| Australia | - | - | - | - | - | - | - | - | 3 | - |
| Korea Rep. | - | - | - | - | - | - | 6 | 6 | 0 | - |
| Turkey | - | - | - | 9 | 6 | 3 | - | - | - | - |
| Denmark | - | - | - | - | 13 | - | - | - | - | - |
| Luxembourg | - | - | - | - | - | 13 | - | - | - | - |
| Portugal | - | - | - | - | - | 34 | - | - | - | - |
| Sweden | - | - | - | - | - | 8 | - | - | - | - |
| Total | 316 | 2 072 | 2 273 | 5 682 | 9 863 | 12 478 | 13 616 | 14 415 | 12 734 | 11 272 |

Source: NMFS.

Table 33 US exports of frozen sharks by country in tonnes

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Germany | 19 | 246 | 469 | 576 | 486 | 597 | 2 104 | 2 286 | 1 248 | 1 139 |
| France | 218 | 867 | 959 | 2 043 | 1 184 | 964 | 2 011 | 2 219 | 1 844 | 801 |
| Japan | 14 | 175 | 316 | 249 | 196 | 540 | 281 | 212 | 110 | 500 |
| UK | 7 | 316 | 161 | 452 | 481 | 316 | 749 | 821 | 380 | 464 |
| Belgium | 59 | 62 | 64 | 372 | 39 | 42 | 365 | 416 | 261 | 180 |
| Canada | 43 | 22 | 32 | 3 | 18 | 26 | 342 | 338 | 47 | 40 |
| Hong Kong | - | 7 | - | 24 | 3 | 34 | 205 | 50 | 263 | 39 |
| Korea Rep. | - | 42 | - | - | - | 40 | - | - | 18 | 19 |
| Thailand | - | 0 | 181 | 187 | 292 | 262 | 206 | 186 | 191 | 13 |
| Mexico | 10 | 2 | 35 | - | 36 | 51 | 27 | 42 | 37 | 13 |
| Australia | - | - | - | - | - | - | 13 | - | 10 | 12 |
| Cayman Is. | - | - | - | - | - | - | - | - | - | 2 |
| Costa Rica | - | - | - | - | - | - | 26 | - | - | - |
| Uruguay | - | - | - | - | - | - | - | - | 235 | - |
| Italy | - | 57 | 196 | 323 | 70 | 61 | 253 | 169 | 28 | - |
| Greece | 32 | 57 | 98 | 22 | - | 230 | 122 | 371 | 26 | - |
| Romania | - | - | - | - | - | - | - | - | 21 | - |
| Switzerland | - | - | - | - | - | - | - | - | 6 | - |
| Norway | - | - | - | 20 | 10 | 20 | 60 | 34 | - | - |
| China | - | - | - | - | - | - | - | 14 | - | - |
| Sweden | - | - | - | 0 | - | - | - | 14 | - | - |
| Singapore | - | - | - | - | 0 | - | 13 | 11 | - | - |
| Colombia | - | - | - | - | - | - | - | 8 | - | - |
| Turkey | - | - | - | - | - | - | - | 7 | - | - |
| Denmark | - | - | - | - | - | 2 | - | 5 | - | - |
| Iceland | - | - | - | - | - | - | 210 | - | - | - |
| Portugal | - | - | - | 44 | 71 | 159 | 17 | - | - | - |
| Netherlands | - | - | 11 | 59 | - | - | 15 | - | - | - |
| Venezuela | - | - | - | - | - | - | 8 | - | - | - |
| Spain | - | 24 | 216 | 359 | 211 | 302 | 4 | - | - | - |
| Ireland | - | 12 | 9 | - | - | - | - | - | - | - |
| Peru | - | 10 | - | - | - | - | - | - | - | - |
| Total | 403 | 1 900 | 2 745 | 4 733 | 3 097 | 3 646 | 7 032 | 7 206 | 4 725 | 3 220 |

Source: NMFS

Table 34 US exports of frozen sharks by country in US\$ 1 000

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|------------|--------------|--------------|---------------|--------------|---------------|---------------|---------------|---------------|--------------|
| Germany | 70 | 963 | 1 437 | 1 196 | 1 127 | 1 890 | 9 031 | 7 982 | 3 239 | 3 091 |
| France | 435 | 1 204 | 1 767 | 4 181 | 2 580 | 3 063 | 3 526 | 3 933 | 3 921 | 1 835 |
| UK | 12 | 605 | 266 | 782 | 843 | 597 | 1 522 | 1 606 | 874 | 1 095 |
| Japan | 59 | 391 | 582 | 447 | 487 | 1 257 | 804 | 450 | 262 | 898 |
| Belgium | 105 | 121 | 126 | 692 | 75 | 84 | 767 | 824 | 474 | 383 |
| Canada | 95 | 40 | 56 | 6 | 27 | 18 | 842 | 1 048 | 133 | 159 |
| Hong Kong | - | 36 | - | 163 | 10 | 71 | 648 | 217 | 561 | 86 |
| Thailand | - | - | 651 | 753 | 902 | 1 717 | 976 | 1 427 | 1 124 | 78 |
| Australia | - | - | - | - | - | - | 10 | - | 20 | 47 |
| Korea Rep. | - | 63 | - | - | - | 130 | - | - | 50 | 40 |
| Mexico | 22 | 4 | 22 | - | 23 | 56 | 33 | 24 | 20 | 13 |
| Cayman Is. | - | - | - | - | - | - | - | - | - | 10 |
| Costa Rica | - | - | - | - | - | - | 32 | - | - | 3 |
| Uruguay | - | - | - | - | - | - | - | - | 187 | - |
| Italy | - | 107 | 426 | 1 237 | 261 | 189 | 477 | 243 | 51 | - |
| Greece | 21 | 69 | 180 | 46 | - | 417 | 227 | 662 | 34 | - |
| Romania | - | - | - | - | - | - | - | - | 23 | - |
| Switzerland | - | - | - | - | - | - | - | - | 12 | - |
| Norway | - | - | - | 27 | 68 | 134 | 415 | 251 | - | - |
| China | - | - | - | - | - | - | - | 150 | - | - |
| Singapore | - | - | - | - | 17 | - | 56 | 88 | - | - |
| Sweden | - | - | - | 3 | - | - | - | 30 | - | - |
| Colombia | - | - | - | - | - | - | - | 17 | - | - |
| Turkey | - | - | - | - | - | - | - | 15 | - | - |
| Denmark | - | - | - | - | - | 11 | - | 14 | - | - |
| Ireland | - | 64 | 56 | - | - | - | - | - | - | - |
| Iceland | - | - | - | - | - | - | 442 | - | - | - |
| Portugal | - | - | - | 267 | 312 | 602 | 58 | - | - | - |
| Spain | - | 22 | 974 | 1 370 | 716 | 1 019 | 35 | - | - | - |
| Netherlands | - | - | 38 | 190 | - | - | 31 | - | - | - |
| Venezuela | - | - | - | - | - | - | 10 | - | - | - |
| Peru | - | 25 | - | - | - | - | - | - | - | - |
| Total | 819 | 3 714 | 6 580 | 11 359 | 7 449 | 11 255 | 19 943 | 18 981 | 10 985 | 7 737 |

Source: NMFS.

Table 35 US imports of dried shark fins by country in kilograms

| Country | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Australia | - | - | - | 241 | - | - | - | - |
| Argentina | - | - | - | - | - | - | - | - |
| Mexico | 32 527 | 18 684 | 18 244 | 26 071 | 30 240 | 15 193 | 11 601 | 18 282 |
| Hong Kong | 3 766 | 3 783 | 3 903 | 5 100 | 4 428 | 5 085 | 4 214 | 7 645 |
| Brazil | 1 821 | - | 799 | 4 484 | 200 | 121 | - | - |
| Gambia | - | - | - | - | - | - | - | - |
| Guatemala | - | - | - | - | - | 1 700 | 2 914 | 1 446 |
| Canada | - | - | - | - | - | - | - | - |
| Panama | - | - | - | - | - | - | 1 039 | 1 071 |
| Singapore | - | 36 | - | - | - | - | 1 089 | - |
| Nicaragua | - | 1 997 | - | - | 1 360 | - | 661 | 580 |
| Trinidad & Tobago | - | - | - | - | - | 738 | - | - |
| Colombia | - | 227 | - | - | - | - | - | - |
| Indonesia | - | - | - | - | - | 139 | - | 144 |
| French Polynesia | - | - | - | - | - | - | - | - |
| Japan | 5 623 | 14 328 | 14 144 | 5 242 | 7 488 | 2 369 | 3 956 | 10 426 |
| South Africa | - | 2 504 | 330 | 50 | 562 | 1 018 | - | 190 |
| China | 80 | 468 | 543 | 560 | 123 | 732 | 231 | 870 |
| Macao | - | - | - | - | - | - | - | - |
| Thailand | - | - | - | 5 | - | - | - | - |
| Costa Rica | 679 | 5 289 | 3 175 | 490 | 3 674 | - | 27 | 47 |
| Viet Nam | - | - | - | - | - | - | - | - |
| Peru | - | - | 250 | 7 973 | 8 363 | 5 259 | 5 843 | 14 192 |
| Ecuador | - | 730 | 408 | 519 | 91 | 181 | 1 627 | 3 505 |
| El Salvador | - | - | - | 2 612 | 230 | 1 221 | 186 | - |
| New Zealand | - | - | - | - | - | - | - | - |
| Tunisia | - | - | - | - | - | - | - | - |
| Guyana | - | - | - | - | - | - | 375 | - |
| Suriname | - | - | - | - | 1 040 | 182 | - | - |
| United Arab Emirates | - | - | - | - | - | - | - | - |
| Guinea | - | - | - | - | - | - | - | - |
| Honduras | - | - | - | - | - | - | - | - |
| India | - | - | 2 332 | - | 116 | - | - | - |
| Chile | - | - | - | - | 925 | 318 | - | - |
| Fiji | - | - | - | - | - | - | - | - |
| France | - | - | - | - | - | - | - | - |
| French Pacific Is. | - | - | - | - | - | - | - | - |
| Ghana | - | - | 437 | 635 | - | - | - | - |
| Malaysia | - | - | - | - | - | - | 45 | - |
| Marshall Is. | - | - | - | - | - | - | - | - |
| Neth. Antilles-Aruba | - | - | 424 | 5 750 | 23 | - | 526 | - |
| Senegal | - | - | - | - | - | 34 | - | - |
| Sierra Leone | - | - | - | - | - | - | - | - |
| Korea Rep. | 279 | 318 | 589 | 91 | - | 193 | 136 | - |
| Spain | - | - | - | 299 | - | - | - | - |
| Taiwan PC | - | 253 | - | - | - | - | - | 20 |
| Uruguay | - | - | - | - | - | - | - | - |
| Venezuela | 454 | 316 | 130 | - | 1 066 | - | - | 892 |
| Others | 48 | 73 | 227 | 1 205 | 750 | 1 806 | 119 | 0 |
| Total | 45 277 | 49 006 | 45 935 | 61 327 | 60 679 | 36 289 | 34 589 | 59 310 |

Table 35 US imports of dried shark fins by country in kilograms (continued)

| Country | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|
| Australia | - | - | - | - | - | - | - | - |
| Argentina | - | - | - | - | 690 | 698 | 50 | - |
| Mexico | 25 334 | 19 537 | 15 066 | 11 309 | 16 771 | 42 806 | 42 022 | 44 247 |
| Hong Kong | 5 446 | 11 003 | 3 494 | 7 941 | 9 274 | 5 633 | 16 808 | 5 583 |
| Brazil | 51 | 1 506 | - | - | 1 079 | 765 | 1 151 | 2 847 |
| Gambia | - | - | - | - | - | - | - | 3 031 |
| Guatemala | 2 979 | 3 287 | 1 077 | 2 417 | 2 204 | 4 199 | 1 810 | 3 575 |
| Canada | 1 066 | - | - | 425 | - | 1 764 | 52 359 | - |
| Panama | - | 1 895 | 4 716 | 7 853 | 5 320 | 19 795 | 21 705 | 17 903 |
| Singapore | - | - | - | 60 | - | 77 | 100 | 362 |
| Nicaragua | - | 714 | - | - | - | - | - | 347 |
| Trinidad & Tobago | - | - | - | - | - | - | 2 184 | 3 282 |
| Colombia | - | - | 975 | 1 071 | 177 | - | 940 | 500 |
| Indonesia | - | - | - | 165 | 1 085 | 1 014 | 1 131 | 250 |
| French Polynesia | - | - | - | - | - | - | 1 628 | 921 |
| Japan | 8 335 | 6 431 | 10 365 | 10 292 | 9 319 | 6 828 | 11 457 | 6 723 |
| South Africa | - | - | - | - | 284 | - | - | - |
| China | 1 521 | 1 410 | 1 460 | 204 | 232 | 68 | 99 | 415 |
| Macao | - | - | - | - | - | - | - | - |
| Thailand | - | - | - | - | - | - | - | 300 |
| Costa Rica | 435 | - | 1 685 | 2 976 | 4 119 | 17 021 | 10 296 | 11 464 |
| Viet Nam | - | - | - | - | - | - | - | - |
| Peru | 12 654 | 10 740 | 10 465 | 27 575 | 32 334 | 1 555 | 4 081 | 1 311 |
| Ecuador | 3 268 | 1 654 | 1 135 | 4 123 | 12 898 | 13 688 | 9 798 | 12 968 |
| El Salvador | 254 | 177 | 1 851 | 1 227 | 15 386 | 3 021 | 663 | 3 227 |
| New Zealand | 390 | - | - | - | - | - | - | - |
| Tunisia | - | - | - | - | - | - | - | - |
| Guyana | - | - | 350 | 680 | - | - | 347 | 1 112 |
| Suriname | - | - | - | - | - | - | 540 | 834 |
| United Arab Emirates | - | - | - | - | - | 90 | 190 | - |
| Guinea | - | - | - | - | - | - | - | - |
| Honduras | - | - | - | - | - | - | - | - |
| India | - | - | - | - | - | - | - | - |
| Chile | 610 | 638 | 840 | - | 241 | - | 685 | 664 |
| Fiji | - | - | - | - | - | - | - | - |
| France | - | - | - | - | - | 4 922 | - | - |
| French Pacific Is. | - | - | - | - | 17 885 | 17 296 | - | - |
| Ghana | - | - | - | - | - | - | 140 | 450 |
| Malaysia | - | - | - | 227 | - | - | 6 648 | 9 979 |
| Marshall Is. | - | - | - | - | - | - | - | - |
| Neth. Antilles-Aruba | - | 454 | - | - | - | - | 985 | 2 670 |
| Senegal | - | - | - | - | - | - | 2 914 | 6 852 |
| Sierra Leone | - | - | - | - | - | - | - | - |
| Korea Rep. | 190 | 226 | 409 | 317 | 318 | 2 254 | 507 | 159 |
| Spain | 1 150 | - | - | - | 647 | 358 | - | 5 328 |
| Taiwan PC | 428 | - | - | - | - | - | 65 | 4 153 |
| Uruguay | - | - | 455 | - | - | - | - | 36 |
| Venezuela | - | 2 040 | 8 800 | 17 537 | 35 604 | 38 465 | 24 761 | 39 282 |
| Others | 415 | 1 005 | 416 | 822 | 8 265 | 3 418 | 3 822 | 993 |
| Total | 64 526 | 62 717 | 63 559 | 97 221 | 174 132 | 185 735 | 219 886 | 191 768 |

Table 35 US imports of dried shark fins by country in kilograms (continued)

| Country | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|
| Australia | 162 | - | 92 | 881 | 235 | 40 | 1 170 | 22 000 |
| Argentina | - | - | - | 2 592 | - | 526 | 13 526 | 10 304 |
| Mexico | 39 812 | 44 056 | 30 001 | 9 265 | 17 853 | 3 500 | 10 727 | 7 046 |
| Hong Kong | 3 734 | 7 228 | 11 493 | 10 057 | 39 824 | 10 916 | 10 991 | 4 736 |
| Brazil | 4 981 | 4 913 | 10 329 | 5 728 | 4 105 | 4 607 | 5 753 | 3 350 |
| Gambia | 900 | - | 635 | - | 44 | 121 | - | 3 200 |
| Guatemala | 10 476 | 11 175 | 9 197 | 7 977 | 3 823 | 3 506 | 11 069 | 2 700 |
| Canada | 8 520 | 24 055 | 1 814 | 10 480 | 16 468 | 9 913 | 928 | 2 462 |
| Panama | 7 352 | 13 125 | 13 149 | 8 916 | 6 282 | 2 670 | 1 435 | 1 163 |
| Singapore | 100 | 3 637 | - | 604 | 7 047 | 466 | 162 | 1 081 |
| Nicaragua | 1 371 | 2 179 | 3 265 | 1 476 | 4 273 | 2 426 | 2 667 | 899 |
| Trinidad & Tobago | 12 939 | 7 039 | 3 752 | 2 325 | 4 589 | 3 692 | 4 311 | 772 |
| Colombia | - | - | 6 200 | 6 161 | 6 385 | 7 027 | 5 490 | 614 |
| Indonesia | 21 | 256 | 298 | - | 424 | 510 | - | 448 |
| French Polynesia | 685 | 1 120 | 214 | 526 | 1 401 | - | 1 422 | 437 |
| Japan | 7 622 | 25 639 | 1 201 | 1 863 | 1 052 | 472 | 611 | 417 |
| South Africa | - | - | - | - | - | - | - | 118 |
| China | 227 | 2 724 | 607 | 1 036 | - | 139 | 638 | 100 |
| Macao | - | - | - | - | - | 138 | 271 | 80 |
| Thailand | 300 | 140 | - | 843 | - | - | - | 79 |
| Costa Rica | 15 228 | 20 800 | 10 956 | 5 612 | 6 496 | 1 481 | 95 | 63 |
| Viet Nam | - | - | - | - | - | - | 73 | 60 |
| Peru | 7 407 | 2 734 | 2 146 | - | 213 | 275 | 240 | 40 |
| Ecuador | 20 562 | 19 469 | 16 500 | 11 695 | 6 679 | 985 | 3 533 | - |
| El Salvador | 9 491 | 8 111 | 5 127 | 6 779 | 9 113 | 4 283 | 897 | - |
| New Zealand | - | - | - | 600 | 10 | - | 799 | - |
| Tunisia | - | - | - | - | - | - | 524 | - |
| Guyana | 1 271 | 15 158 | 16 803 | 1 630 | 3 472 | 1 086 | 294 | - |
| Suriname | 1 452 | - | - | 83 | 667 | 705 | - | - |
| United Arab Emirates | - | 365 | - | - | 21 | 400 | - | - |
| Guinea | - | - | - | - | - | 260 | - | - |
| Honduras | 227 | 496 | 108 | 171 | - | 148 | - | - |
| India | 351 | 100 | - | - | - | 35 | - | - |
| Chile | 1 442 | - | 70 | - | - | - | - | - |
| Fiji | - | 45 | 1 860 | 1 099 | - | - | - | - |
| France | 10 550 | 4 443 | - | - | - | - | - | - |
| French Pacific Is. | - | - | - | - | - | - | - | - |
| Ghana | 239 | 230 | - | 429 | 1 189 | - | - | - |
| Malaysia | - | 417 | - | - | - | - | - | - |
| Marshall Is. | - | - | 1 331 | 3 048 | - | - | - | - |
| Neth. Antilles-Aruba | 8 602 | 11 874 | 12 144 | 9 688 | - | - | - | - |
| Senegal | 7 706 | 717 | 48 | - | - | - | - | - |
| Sierra Leone | - | 1 985 | 8 796 | - | - | - | - | - |
| Korea Rep. | 181 | 187 | 980 | - | - | - | - | - |
| Spain | 3 967 | 13 637 | 258 | 810 | - | - | - | - |
| Taiwan PC | 10 739 | 555 | 3 600 | - | - | - | - | - |
| Uruguay | 2 074 | 8 276 | 20 690 | 826 | - | - | - | - |
| Venezuela | 37 939 | 20 129 | 6 347 | 962 | 570 | - | - | - |
| Others | 1 828 | 3 632 | 2 262 | 169 | - | 80 | - | - |
| Total | 240 458 | 280 646 | 202 273 | 114 331 | 142 235 | 60 407 | 77 626 | 62 169 |

Source: NMFS.

Table 36 US imports of dried shark fins by country in US\$ 1 000

| Country | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|----------------------|------------|------------|------------|------------|--------------|--------------|--------------|--------------|
| Canada | - | - | - | - | - | - | - | - |
| Australia | - | - | - | 15 | - | - | - | - |
| Hong Kong | 56 | 94 | 163 | 228 | 246 | 283 | 286 | 276 |
| Brazil | 11 | - | 11 | 60 | 3 | 7 | - | - |
| Mexico | 116 | 87 | 146 | 98 | 566 | 377 | 285 | 362 |
| Argentina | - | - | - | - | - | - | - | - |
| Panama | - | - | - | - | - | - | 11 | 25 |
| Indonesia | - | - | - | - | - | 9 | - | 8 |
| Colombia | - | 5 | - | - | - | - | - | - |
| Guatemala | - | - | - | - | - | 16 | 24 | 5 |
| Nicaragua | - | 23 | - | - | 10 | - | 8 | 6 |
| Japan | 83 | 273 | 358 | 189 | 282 | 125 | 259 | 493 |
| Trinidad & Tobago | - | - | - | - | - | 11 | - | - |
| French Polynesia | - | - | - | - | - | - | - | - |
| Macao | - | - | - | - | - | - | - | - |
| Gambia | - | - | - | - | - | - | - | - |
| Peru | - | - | 2 | 74 | 170 | 97 | 102 | 329 |
| Costa Rica | 5 | 53 | 33 | 4 | 73 | - | - | 1 |
| Singapore | - | 1 | - | - | - | - | 3 | - |
| Viet Nam | - | - | - | - | - | - | - | - |
| Thailand | - | - | - | 1 | - | - | - | - |
| China | 1 | 10 | 23 | 18 | 5 | 48 | 9 | 28 |
| South Africa | - | 51 | 5 | 3 | 25 | 53 | - | 11 |
| Ecuador | - | 10 | 6 | 3 | 1 | 8 | 12 | 31 |
| New Zealand | - | - | - | - | - | - | - | - |
| El Salvador | - | - | - | 33 | 2 | 8 | 1 | - |
| Tunisia | - | - | - | - | - | - | - | - |
| Guyana | - | - | - | - | - | - | 1 | - |
| Suriname | - | - | - | - | 4 | 1 | - | - |
| United Arab Emirates | - | - | - | - | - | - | - | - |
| Guinea | - | - | - | - | - | - | - | - |
| India | - | - | 33 | - | 9 | - | - | - |
| Honduras | - | - | - | - | - | - | - | - |
| Chile | - | - | - | - | 7 | 5 | - | - |
| Fiji | - | - | - | - | - | - | - | - |
| France | - | - | - | - | - | - | - | - |
| French Pacific Is. | - | - | - | - | - | - | - | - |
| Ghana | - | - | - | 1 | - | - | - | - |
| Malaysia | - | - | - | - | - | - | 2 | - |
| Marshall Is. | - | - | - | - | - | - | - | - |
| Neth. Antilles-Aruba | - | - | 3 | 29 | 2 | - | 1 | - |
| Senegal | - | - | - | - | - | 1 | - | - |
| Sierra Leone | - | - | - | - | - | - | - | - |
| Korea Rep. | 8 | 8 | 2 | 5 | - | 18 | 11 | - |
| Spain | - | - | - | 11 | - | - | - | - |
| Taiwan PC | - | 5 | - | - | - | - | - | 1 |
| Uruguay | - | - | - | - | - | - | - | - |
| Venezuela | 3 | 1 | 1 | - | 19 | - | - | 9 |
| Others | 0 | 1 | 3 | 30 | 26 | 49 | 9 | 0 |
| Total | 283 | 621 | 789 | 803 | 1 450 | 1 114 | 1 024 | 1 584 |

Table 36 US imports of dried shark fins by country in in US\$ 1 000 (continued)

| Country | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Canada | 14 | - | - | 18 | - | 7 | 190 | - |
| Australia | - | - | - | - | - | - | - | - |
| Hong Kong | 226 | 273 | 111 | 327 | 240 | 216 | 713 | 269 |
| Brazil | 11 | 33 | - | - | 23 | 21 | 34 | 69 |
| Mexico | 561 | 426 | 279 | 202 | 339 | 956 | 766 | 660 |
| Argentina | - | - | - | - | 6 | 6 | 3 | - |
| Panama | - | 62 | 108 | 68 | 55 | 247 | 320 | 426 |
| Indonesia | - | - | - | 4 | 102 | 54 | 62 | 22 |
| Colombia | - | - | 17 | 21 | 7 | - | 63 | 20 |
| Guatemala | 6 | 7 | 3 | 11 | 18 | 53 | 19 | 56 |
| Nicaragua | - | 9 | - | - | - | - | - | 12 |
| Japan | 448 | 357 | 635 | 589 | 480 | 374 | 325 | 341 |
| Trinidad & Tobago | - | - | - | - | - | - | 49 | 65 |
| French Polynesia | - | - | - | - | - | - | 29 | 18 |
| Macao | - | - | - | - | - | - | - | - |
| Gambia | - | - | - | - | - | - | - | 101 |
| Peru | 299 | 329 | 329 | 512 | 419 | 24 | 50 | 22 |
| Costa Rica | 4 | - | 23 | 28 | 58 | 520 | 374 | 383 |
| Singapore | - | - | - | 3 | - | 5 | 9 | 14 |
| Viet Nam | - | - | - | - | - | - | - | - |
| Thailand | - | - | - | - | - | - | - | 9 |
| China | 63 | 45 | 82 | 6 | 9 | 3 | 8 | 23 |
| South Africa | - | - | - | - | 7 | - | - | - |
| Ecuador | 16 | 11 | 19 | 54 | 153 | 94 | 303 | 285 |
| New Zealand | 6 | - | - | - | - | - | - | - |
| El Salvador | 4 | 4 | 29 | 11 | 130 | 86 | 25 | 91 |
| Tunisia | - | - | - | - | - | - | - | - |
| Guyana | - | - | 1 | 5 | - | - | 4 | 21 |
| Suriname | - | - | - | - | - | - | 21 | 18 |
| United Arab Emirates | - | - | - | - | - | 4 | 9 | - |
| Guinea | - | - | - | - | - | - | - | - |
| India | - | - | - | - | - | - | - | - |
| Honduras | - | - | - | - | - | - | - | - |
| Chile | 5 | 13 | 17 | - | 6 | - | 17 | 15 |
| Fiji | - | - | - | - | - | - | - | - |
| France | - | - | - | - | - | 108 | - | - |
| French Pacific Is. | - | - | - | - | 181 | 326 | - | - |
| Ghana | - | - | - | - | - | - | 3 | 3 |
| Malaysia | - | - | - | 5 | - | - | 29 | 69 |
| Marshall Is. | - | - | - | - | - | - | - | - |
| Neth. Antilles-Aruba | - | 4 | - | - | - | - | 23 | 66 |
| Senegal | - | - | - | - | - | - | 70 | 137 |
| Sierra Leone | - | - | - | - | - | - | - | - |
| Korea Rep. | 18 | 19 | 34 | 27 | 29 | 52 | 62 | 25 |
| Spain | 22 | - | - | - | 22 | 14 | - | 48 |
| Taiwan PC | 1 | - | - | - | - | - | 3 | 98 |
| Uruguay | - | - | 7 | - | - | - | - | 1 |
| Venezuela | - | 14 | 252 | 388 | 261 | 369 | 290 | 658 |
| Others | 12 | 13 | 11 | 13 | 102 | 77 | 99 | 30 |
| Total | 1 716 | 1 620 | 1 958 | 2 292 | 2 647 | 3 615 | 3 970 | 4 077 |

Table 36 US imports of dried shark fins by country in in US\$ 1 000 (continued)

| Country | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Canada | 146 | 503 | 97 | 283 | 197 | 100 | 2 | 367 |
| Australia | 16 | - | 13 | 39 | 16 | 2 | 20 | 355 |
| Hong Kong | 65 | 238 | 1 904 | 1 306 | 217 | 476 | 351 | 193 |
| Brazil | 29 | 189 | 529 | 152 | 202 | 274 | 355 | 161 |
| Mexico | 375 | 857 | 750 | 310 | 209 | 101 | 734 | 123 |
| Argentina | - | - | - | 45 | - | 32 | 206 | 111 |
| Panama | 184 | 480 | 516 | 336 | 153 | 107 | 108 | 74 |
| Indonesia | 3 | 31 | 52 | - | 22 | 6 | - | 45 |
| Colombia | - | - | 123 | 243 | 367 | 374 | 430 | 44 |
| Guatemala | 206 | 225 | 291 | 122 | 55 | 83 | 157 | 39 |
| Nicaragua | 14 | 54 | 160 | 126 | 197 | 30 | 70 | 32 |
| Japan | 463 | 292 | 170 | 144 | 103 | 40 | 43 | 30 |
| Trinidad & Tobago | 245 | 283 | 96 | 93 | 72 | 133 | 166 | 28 |
| French Polynesia | 15 | 29 | 3 | 55 | 30 | - | 61 | 18 |
| Macao | - | - | - | - | - | 14 | 19 | 17 |
| Gambia | 43 | - | 10 | - | 5 | 7 | - | 16 |
| Peru | 182 | 101 | 38 | - | 14 | 9 | 6 | 11 |
| Costa Rica | 448 | 1 028 | 498 | 162 | 121 | 196 | 5 | 11 |
| Singapore | 13 | 475 | - | 12 | 23 | 12 | 20 | 6 |
| Viet Nam | - | - | - | - | - | - | 15 | 6 |
| Thailand | 28 | 9 | - | 2 | - | - | - | 5 |
| China | 5 | 17 | 147 | 83 | - | 7 | 46 | 4 |
| South Africa | - | - | - | - | - | - | - | 4 |
| Ecuador | 294 | 481 | 416 | 133 | 147 | 5 | 139 | - |
| New Zealand | - | - | - | 29 | 2 | - | 45 | - |
| El Salvador | 378 | 336 | 172 | 114 | 117 | 125 | 42 | - |
| Tunisia | - | - | - | - | - | - | 13 | - |
| Guyana | 8 | 162 | 186 | 13 | 34 | 31 | 8 | - |
| Suriname | 4 | - | - | 6 | 6 | 60 | - | - |
| United Arab Emirates | - | 35 | - | - | 3 | 20 | - | - |
| Guinea | - | - | - | - | - | 19 | - | - |
| India | 6 | 6 | - | - | - | 3 | - | - |
| Honduras | 12 | 20 | 4 | 8 | - | 2 | - | - |
| Chile | 21 | - | 3 | - | - | - | - | - |
| Fiji | - | 2 | 43 | 30 | - | - | - | - |
| France | 118 | 49 | - | - | - | - | - | - |
| French Pacific Is. | - | - | - | - | - | - | - | - |
| Ghana | 1 | 2 | - | 7 | 12 | - | - | - |
| Malaysia | - | 17 | - | - | - | - | - | - |
| Marshall Is. | - | - | 32 | 26 | - | - | - | - |
| Neth. Antilles-Aruba | 189 | 390 | 349 | 366 | - | - | - | - |
| Senegal | 109 | 100 | 2 | - | - | - | - | - |
| Sierra Leone | - | 80 | 107 | - | - | - | - | - |
| Korea Rep. | 29 | 13 | 10 | - | - | - | - | - |
| Spain | 52 | 553 | 13 | 42 | - | - | - | - |
| Taiwan PC | 188 | 21 | 9 | - | - | - | - | - |
| Uruguay | 75 | 300 | 982 | 49 | - | - | - | - |
| Venezuela | 1 296 | 888 | 303 | 18 | 27 | - | - | - |
| Others | 3 | 113 | 66 | 8 | - | 2 | 0 | - |
| Total | 5 263 | 8 376 | 8 094 | 4 361 | 2 348 | 2 270 | 3 060 | 1 699 |

Source: NMFS.

Table 37 US imports of shark liver oil by country in kilograms

| Country | Canada | Japan | Switzer land | Mexico | Norway | Israel | France | Total |
|---------|--------|-------|-----------------|--------|--------|--------|--------|--------|
| 1972 | - | 4 500 | - | - | - | - | - | 4 500 |
| 1973 | 28 077 | - | - | - | - | - | - | 28 077 |
| 1974 | - | - | - | - | - | - | - | - |
| 1975 | - | - | - | - | - | - | - | - |
| 1976 | - | 180 | - | - | - | - | - | 180 |
| 1977 | - | - | - | - | - | - | - | - |
| 1978 | - | - | 270 | - | - | - | - | 270 |
| 1979 | - | 3 600 | 50 | - | - | - | - | 3 650 |
| 1980 | - | - | - | - | - | - | - | - |
| 1981 | - | - | - | - | - | - | - | - |
| 1982 | - | - | - | 771 | - | - | - | 771 |
| 1983 | - | 23 | - | - | - | - | - | 23 |
| 1984 | - | - | - | - | 380 | - | - | 380 |
| 1985 | - | 5 265 | - | - | - | - | - | 5 265 |
| 1986 | - | - | - | - | - | - | - | - |
| 1987 | - | 197 | - | - | - | 77 195 | 200 | 77 592 |
| 1988 | - | 120 | - | - | - | - | - | 120 |

Source: NMFS.

Table 38 US imports of shark liver oil by country in US\$

| Country | Canada | Japan | Switzer land | Mexico | Norway | Israel | France | Total |
|---------|--------|--------|-----------------|--------|--------|--------|--------|--------|
| 1972 | - | na | - | - | - | - | - | na |
| 1973 | na | - | - | - | - | - | - | na |
| 1974 | - | - | - | - | - | - | - | - |
| 1975 | - | - | - | - | - | - | - | - |
| 1976 | - | 275 | - | - | - | - | - | 275 |
| 1977 | - | - | - | - | - | - | - | - |
| 1978 | - | - | 9 136 | - | - | - | - | 9 136 |
| 1979 | - | 10 406 | 2 035 | - | - | - | - | 12 441 |
| 1980 | - | - | - | - | - | - | - | - |
| 1981 | - | - | - | - | - | - | - | - |
| 1982 | - | - | - | 3 609 | - | - | - | 3 609 |
| 1983 | - | 731 | - | - | - | - | - | 731 |
| 1984 | - | - | - | - | 2 233 | - | - | 2 233 |
| 1985 | - | 10 371 | - | - | - | - | - | 10 371 |
| 1986 | - | - | - | - | - | - | - | - |
| 1987 | - | 3 342 | - | - | - | 24 677 | 4 433 | 32 452 |
| 1988 | - | 2 904 | - | - | - | - | - | 2 904 |

Source: NMFS.

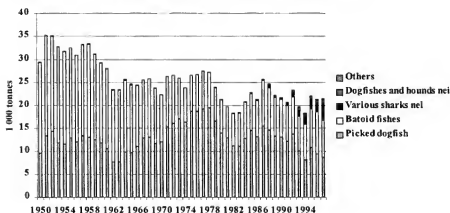
7.2 UK

7.2.1 Catches

The UK is the second largest European elasmobranch fishing nation, behind France. In 1997 landings were over 21 400 tonnes, a 27.1% decline from 29 400 tonnes in 1950 and 0.5% more than the previous year. Major catches were achieved in the 1950s with an average of 32 600 tonnes annually, the peak year being 1951 with 35 300 tonnes. The average catch declined in the 1960s to 27 700 tonnes and in the 1970s to 25 700 tonnes. From 1979 to 1982 catches decreased steadily to reach a low of 18 300 tonnes in 1982. Since then catches have fluctuated.

In 1997 sharks represented 62.1% of the total UK elasmobranch catches. Picked dogfish was the leading species caught with 8 700 tonnes, followed by 3 900 tonnes of "various sharks not identified", 660 tonnes of "dogfish and catsharks not identified", 55 tonnes of tope shark and 47 tonnes of angel sharks. Catches of picked dogfish have shown several fluctuations from 1950 to the present, with a major increase registered in the 1970s, peaking at 19 500 tonnes in 1978. They reached a low of 6 800 tonnes in 1982. In 1997 they were at 8 700 tonnes, a 7.8% decline on 1996. According to Holden¹²⁰, catches of picked dogfish have existed since the beginning of the twentieth century, but they did not exceed 2 850 tonnes until 1931.

Figure 65 UK elasmobranch catches by species in 1 000 tonnes, 1950-1997



Source: FAO - FIDI.

Sharks are subject to both directed commercial and recreational fisheries¹²¹. Target commercial fisheries exist particularly for picked dogfish and skate, but a great proportion of these

¹²⁰ HOLDEN M.J., "Elasmobranchii" PP. 187-215. In J.A. Gulland Ed "Fish population Dynamics", J. Wiley and sons, London, UK, 1977.

¹²¹ VAS P., "The status and conservation of sharks in Britain". Aquatic conservation: marine and freshwater ecosystems 5: 67-79, 1995.

species is also caught as bycatch from trawl fisheries. Picked dogfish and catsharks (*Scyliorhinus canicula*, *S. stellaris*) are the most abundant and widespread species found in British coastal waters. Other species captured are nursehound and basking sharks. Fisheries targeting cod, haddock and hake catch species like blue shark, porbeagle and tope sharks incidentally. Porbeagle are fished recreationally with captures of around 100 sharks per year. An estimated 500 tope sharks are landed annually as bycatch, while recreational catches for these species are around 5 000 sharks per year, which are generally released. Recently a small-scale longline fishery for blue sharks started operating off the south coast of Cornwall. Blue sharks have been targeted recreationally off the Cornish coast since 1953. Present catches are around 500 sharks annually. In the past there were also target fisheries for basking sharks for their liver oil. According to Kunzlik¹²², in the 1940s a fishery for basking sharks existed, mainly on the West Coast of Scotland. According to ICCAT between 1951-55 the basking sharks fishery peaked with over 1 000 sharks harvested annually. From 1983 basking sharks were the target of a single boat in the Clyde and northern Irish Sea, but this fishery has now stopped. Nowadays, small local catches are reported.

Until the late 1970s dogfish were mainly caught by side-trawlers in the North Sea and middle-water grounds and by a small fleet of East coast liners working a seasonal directed fishery. More recently there has been a growth in target fisheries by liners in the Channel, North Sea and Irish Sea together with bigger harvests being taken by Scottish fly-draggers¹²³.

Nearly all UK elasmobranch catches come from the Northeast Atlantic with very limited captures in the Southwest Atlantic, Antarctic Atlantic and Northwest Atlantic. According to Bonfil¹²⁴, during 1978-91, nearly half the picked dogfish were harvested in England and Wales with equal quantity in Scottish waters and around 6% from Northern Ireland. Major ports are those of Grimsby, Milford Haven, Peterhead and Aberdeen. Catches of sharks from waters along the shelf edge and in the Celtic Sea have grown since the late 1980s due to the activity of the Anglo-Spanish fleet and the arrival of tuna drift-netting by some Cornish and Irish boats.

Figure 66 UK elasmobranch catches by fishing areas in 1 000 tonnes, 1950-1997



Source: FAO - FIDI.

Until March 1998 there was no legislation at a national level for managing elasmobranch catches in the UK but there were some regional regulations to limit the size of sharks and rays

¹²² KUNSLIK P.A., "The basking shark, Scottish Fisheries Information Pamphlet No. 14, Department of Agriculture and Fisheries of Scotland. 21 pp., 1988.

¹²³ SEA FISH INDUSTRY AUTHORITY, "Report No 2003, Species Profile: dogfish, UK, 1991.

¹²⁴ BONFIL R., *idem*.

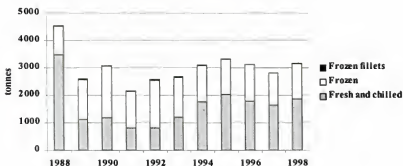
landed in those areas. Three sea fisheries committees have established regional legislation planning to institute minimum size limits for skates and rays captured. Basking sharks were protected within a three-mile zone off the Isle of Man and, since 9 March 1998, throughout all UK national waters. On September 1997 the shark trust was established. This is the first organisation in the UK dedicated to promoting research into and conservation and management of sharks, rays and chimaeras.

7.2.2 Markets and trade

After the First World War shark meat began to be introduced into British fish-and-chip shops and nowadays UK is one of the major European markets for pickled dogfish. Sharks are supplied by domestic landings and imports. As most dogfish caught in the UK is for the domestic market, the amount caught is correlated to local market demand. According to FAO statistics, UK production of elasmobranch consisted only of frozen sharks. Since 1976 it has shown a series of fluctuations, peaking at 2 100 tonnes in 1978 and bottoming at 180 tonnes in 1993.

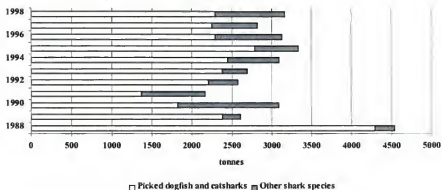
UK imports of fresh and frozen sharks were particularly substantial in the mid 1980s, rising to 7 400 tonnes in 1987. According to data provided by the Sea Fish Industry Authority, 1998 imports were nearly 3 200 tonnes, worth US\$7.8 million, a 12.3% growth in volume and 22.5% in value from 1997. The bulk of the imports (72.2%) is pickled dogfish of which 1 200 tonnes, valued at US\$3.1 million, is fresh and 1 100 tonnes, worth US\$3.2 million, is frozen. Only 4 tonnes of catsharks were imported, valued at US\$4 900. Imports of other sharks were around 880 tonnes, worth US\$1.5 million, of which 680 tonnes (US\$1.2 million) were fresh, 180 tonnes (US\$283 400) frozen whole and 20 tonnes (US\$60 500) were frozen fillets. Imports of fresh shark have declined considerably in the early 1990s to a low of 810 tonnes in 1991. This decline was particularly marked for pickled dogfish; only 150 tonnes in that year.

Figure 67 UK shark imports by product forms in tonnes



Source: EUROSTAT/Sea Fish Industry Authority.

Figure 68 UK shark imports by species in tonnes



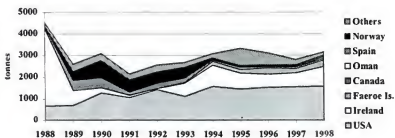
Source: EUROSTAT/Sea Fish Industry Authority.

In 1998 the USA was by far the largest supplier to the UK with 1 590 tonnes, worth US\$5.3 million, followed by Ireland (900 tonnes, worth US\$1.1 million) and Faeroe Islands (310 tonnes, worth US\$413 700). Imports from the USA have grown considerably in the past few years. In 1988 they amounted to 670 tonnes, rising to a maximum of 1 600 tonnes in 1994. Imports from the USA consist almost entirely of picked dogfish which amounted to 1 020 tonnes, worth US\$3.0 million, fresh and nearly 1 030 tonnes, worth US\$3.0 million, frozen in 1998.

In the past Norway was the traditional supplier of picked dogfish to the UK. In 1974, out of a total of nearly 1 200 tonnes, worth US\$1.1 million, Norway exported nearly 1 100 tonnes to the UK. In 1990 these exports were around 800 tonnes but now Norway exports only small amounts of picked dogfish and catsharks to the UK, 8 tonnes, worth US\$12 320, in 1998.

In 1998 main suppliers for other sharks were Ireland and Faeroe Islands, while the 4 tonnes of catsharks came from Norway.

Figure 69 UK shark imports by country of origin in tonnes

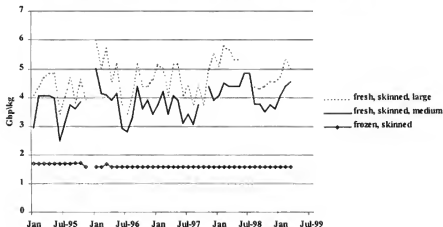


Source: EUROSTAT/Sea Fish Industry Authority.

The UK requires dressed carcasses (head-off, tail-off, skin-off, gutted). Picked dogfish imported from the USA is considered better quality than native, due to better handling. Most of the imports of fresh, whole dogfish are destined for the processing industry and only small quantities of this production is for the domestic market as it is often re-exported to other European countries in particular to France, Belgium and Germany. Processing of belly flaps is entirely for the German market. Imports of frozen products are usually for domestic use but may also be exported via brokerage.

Dogfish is mainly used in the fish and chip trade, in London and southern England in particular. The amount sold for home consumption is not very large but it has been growing. The terms shark and dogfish are considered to have a negative impact on UK consumers, so shark in the UK is usually marketed as rock salmon but names like flake, huss and rock eel are sometimes used. In March 1999, the wholesale price for fresh skinned dogfish, medium size was US\$7.45/kg, that for larger sizes US\$8.30/kg. The price for frozen skinned dogfish ranged between US\$2.20/kg and US\$3.12/kg.

Figure 70 Wholesale prices for fresh and frozen dogfish in Gbp/kg



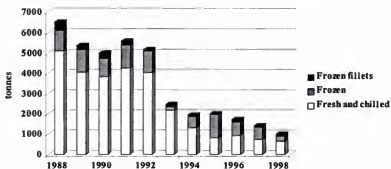
Source: Billingsgate.

The small amounts of blue shark, caught usually as bycatch, are not considered as high quality fish and are generally exported to France. However, the few small spotted catsharks caught are used in the fish and chips trade.

UK exports a significant proportion of its production and also re-exports sharks after processing. Exports of sharks (mainly processed backs) have been very varied since 1976. They peaked at 8 000 tonnes in 1987, decreased considerably in the last few years and in 1998 were only at 990 tonnes, worth US\$3.5 million, according to statistics of the Sea Fish Industry Authority. There has been a steep decline since 1993 when they fell by 52% compared with the previous year. This decrease is correlated to the decline in the UK share of supply to France,

which continues to represent the principal market for its exports. In the past UK was the principal supplier of fresh whole picked dogfish to France, a role that now has been taken by the USA. In the last few years UK shark exports to France have steadily declined to 610 tonnes, worth US\$1.9 million, in 1998. In 1988 these exports amounted to 5 300 tonnes. Also, exports to Germany have significantly diminished to only 57 tonnes, worth US\$155 200, in 1998. Germany was the traditional destination for belly flaps, which were smoked to obtain the *Schillerlocken*, a typical German product. In 1998 UK also exported 224 tonnes, worth US\$1.1 million, to Italy and nearly 30 tonnes, worth US\$106 100 to Singapore.

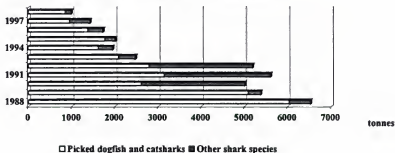
Figure 71 UK shark exports by product forms in tonnes



Source: EUROSTAT/ Sea Fish Industry Authority.

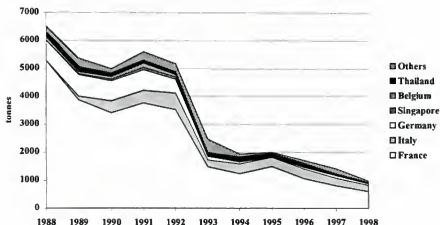
The great bulk of UK exports are fresh, with 630 tonnes out of 990 tonnes in 1998. In the same year 81.5% of exports consisted of picked dogfish, 13.7% of other sharks and 4.8% of catsharks. Exports of picked dogfish were mainly destined for France and Italy; catsharks were sent to France, Italy and Spain and the other sharks went to France, Singapore, Norway and Germany.

Figure 72 UK shark exports by species in tonnes



Source: EUROSTAT/ Sea Fish Industry Authority.

Figure 73 UK shark exports by countries in tonnes



Source: EUROSTAT/Sea Fish Industry Authority.

A few processors/distributors dominate the UK shark trade. They are based in Grimsby, Fleetwood, Aberdeen, Fraserburgh and Newlyn.

UK sharks are not considered suitable for fin production except for *Lamna nasus* but this species is harvested in very small quantities. There are a few factories which process picked dogfish pectoral fins and tails as by-products and export them to markets in the Far East. There are indications that this practice could increase. As the UK has one of the major Chinese immigrant and naturalised Chinese populations in Europe, mainly in London and Manchester, there are imports of canned fin soup, dried and processed fins and dried whole fins.

In the UK, small-spotted catsharks and nursehounds are used as bait in pot fisheries for crustaceans and molluscs¹²⁵.

The UK imports shark cartilage products. Prices are around US\$16.30 per 90 capsules of 500mg shark cartilage and US\$65.50 per 200g of shark cartilage in powder.

¹²⁵ FLEMING E.H., PAPAGEORGIOU P.A., "Shark fisheries and trade in Europe", TRAFFIC Europe, 1996.

Table 39 UK elasmobranch catches by species in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Picked dogfish | 9 600 | 13 400 | 14 400 | 11 800 | 11 500 | 12 900 | 12 100 | 13 400 | 13 100 | 12 500 |
| Raja rays nei | 19 700 | 21 800 | 20 600 | 20 900 | 20 200 | 19 700 | 18 800 | 19 800 | 20 200 | 18 500 |
| Various sharks nei | - | - | - | - | - | - | - | - | - | - |
| Dogfishes and hounds nei | 100 | 100 | 100 | 100 | 100 | - | - | 100 | 100 | 200 |
| Tope shark | - | - | - | - | - | - | - | - | - | - |
| Angelsharks, sand devils nei | - | - | - | - | - | - | - | - | - | - |
| Rays, stingrays, mantas nei | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, etc. nei | - | - | - | - | - | - | - | - | - | - |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | - | - |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Total | 29 400 | 35 300 | 35 100 | 32 800 | 31 800 | 32 600 | 30 900 | 33 300 | 33 400 | 31 200 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Picked dogfish | 11 800 | 10 600 | 7 700 | 7 700 | 9 800 | 9 700 | 11 000 | 12 900 | 13 000 | 11 700 |
| Raja rays nei | 17 340 | 17 314 | 15 615 | 15 677 | 15 708 | 14 750 | 13 374 | 12 651 | 12 825 | 12 000 |
| Various sharks nei | - | - | - | - | - | - | - | - | - | - |
| Dogfishes and hounds nei | 200 | 100 | 100 | 100 | 200 | 300 | 100 | - | - | 100 |
| Tope shark | - | - | - | - | - | - | - | - | - | - |
| Angelsharks, sand devils nei | - | - | - | - | - | - | - | - | - | - |
| Rays, stingrays, mantas nei | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, etc. nei | - | - | - | - | - | - | - | - | - | - |
| Dogfish sharks nei | - | - | 8 | 1 | 8 | 0 | 0 | 10 | 0 | 0 |
| Porbeagle | - | - | 0 | 0 | - | - | - | - | - | - |
| Total | 29 340 | 28 014 | 23 423 | 23 478 | 25 716 | 24 750 | 24 474 | 25 561 | 25 825 | 23 800 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Picked dogfish | 12 100 | 15 400 | 16 200 | 17 100 | 16 354 | 18 761 | 18 737 | 19 292 | 19 454 | 16 673 |
| Raja rays nei | 10 300 | 10 905 | 10 435 | 8 852 | 7 476 | 7 864 | 7 979 | 8 132 | 7 709 | 7 232 |
| Various sharks nei | 0 | 0 | - | - | 13 | 13 | 19 | 18 | 32 | 31 |
| Dogfishes and hounds nei | - | - | - | - | - | - | - | - | 0 | 0 |
| Tope shark | - | - | - | - | - | - | - | - | - | - |
| Angelsharks, sand devils nei | - | - | - | - | - | - | - | - | - | - |
| Rays, stingrays, mantas nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sharks, rays, skates, etc. nei | - | - | - | - | - | - | - | - | - | - |
| Dogfish sharks nei | 0 | 0 | - | 0 | 4 | 0 | - | 0 | 0 | 0 |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Total | 22 400 | 26 305 | 26 635 | 25 952 | 23 847 | 26 638 | 26 735 | 27 442 | 27 195 | 23 936 |

Table 39 UK elasmobranch catches by species in tonnes (continued)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Pieked dogfish | 14 066 | 12 932 | 11 234 | 11 010 | 12 810 | 14 483 | 13 183 | 15 577 | 14 618 | 13 311 |
| Raja rays nei | 7 233 | 6 802 | 7 011 | 7 344 | 7 916 | 8 152 | 7 900 | 9 803 | 9 104 | 8 439 |
| Various sharks nei | 56 | 74 | 101 | 41 | 29 | 17 | 23 | 27 | 311 | 60 |
| Dogfishes and hounds nei | 0 | 0 | 0 | 122 | 144 | 164 | 234 | 245 | 310 | 228 |
| Topo shark | - | - | - | - | - | - | - | - | - | 74 |
| Angelsharks, sand devils nei | - | - | - | - | - | - | - | - | - | 2 |
| Rays, stingrays, mantas nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 180 | 47 |
| Sharks, rays, skates, etc. nei | - | - | - | - | 0 | 0 | 0 | 0 | 0 | 0 |
| Dogfish sharks nei | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Total | 21 355 | 19 808 | 18 346 | 18 517 | 20 899 | 22 816 | 21 340 | 25 681 | 24 523 | 22 161 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Pieked dogfish | 13 081 | 12 171 | 13 812 | 10 032 | 8 072 | 10 815 | 9 423 | 8 691 | | |
| Raja rays nei | 8 331 | 7 841 | 8 046 | 7 538 | 7 781 | 8 373 | 9 157 | 8 088 | | |
| Various sharks nei | 57 | 378 | 1 119 | 1 393 | 1 944 | 2 339 | 2 040 | 3 865 | | |
| Dogfishes and hounds nei | 247 | 230 | 366 | 638 | 487 | 553 | 654 | 660 | | |
| Topo shark | 59 | 68 | 68 | 62 | 71 | 63 | 53 | 55 | | |
| Angelsharks, sand devils nei | 1 | 1 | - | - | - | - | - | 47 | | |
| Rays, stingrays, mantas nei | - | 1 | 1 | 29 | 3 | 12 | 8 | 21 | | |
| Sharks, rays, skates, etc. nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | | |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | | |
| Porbeagle | - | - | - | - | - | - | - | - | | |
| Total | 21 776 | 20 690 | 23 412 | 19 692 | 18 358 | 22 155 | 21 335 | 21 443 | | |

Source: FAO - FIDI.

Table 40 UK elasmobranch catches by fishing area in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Atlantic, Northeast | 29 400 | 35 300 | 35 100 | 32 800 | 31 800 | 32 600 | 30 900 | 33 300 | 33 400 | 31 200 |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Antarctic | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | - | - |
| Total | 29 400 | 35 300 | 35 100 | 32 800 | 31 800 | 32 600 | 30 900 | 33 300 | 33 400 | 31 200 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Atlantic, Northeast | 29 300 | 28 000 | 23 400 | 23 400 | 25 500 | 24 500 | 24 200 | 25 400 | 25 800 | 23 800 |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Antarctic | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | 40 | 14 | 23 | 78 | 216 | 250 | 274 | 161 | 25 | 0 |
| Total | 29 340 | 28 014 | 23 423 | 23 478 | 25 716 | 24 750 | 24 474 | 25 561 | 25 825 | 23 800 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Atlantic, Northeast | 22 400 | 26 300 | 26 600 | 25 900 | 23 718 | 26 638 | 26 735 | 27 442 | 27 164 | 23 936 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Antarctic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Northwest | - | 5 | 35 | 52 | 129 | - | - | - | 31 | 0 |
| Total | 22 400 | 26 305 | 26 635 | 25 952 | 23 847 | 26 638 | 26 735 | 27 442 | 27 195 | 23 936 |
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Atlantic, Northeast | 21 355 | 19 808 | 18 346 | 18 517 | 20 899 | 22 816 | 21 340 | 25 652 | 24 343 | 22 114 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 180 | 47 |
| Atlantic, Antarctic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Northwest | 0 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 0 |
| Total | 21 355 | 19 808 | 18 346 | 18 517 | 20 899 | 22 816 | 21 340 | 25 681 | 24 523 | 22 161 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Atlantic, Northeast | 21 776 | 20 688 | 23 408 | 19 663 | 18 355 | 22 143 | 21 327 | 21 406 | | |
| Atlantic, Southwest | - | 1 | 0 | 29 | 3 | 12 | 8 | 33 | | |
| Atlantic, Antarctic | - | - | 1 | 0 | 0 | 0 | 0 | 4 | | |
| Atlantic, Northwest | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | | |
| Total | 21 776 | 20 690 | 23 412 | 19 692 | 18 358 | 22 155 | 21 335 | 21 443 | | |

Source: FAO - FIDI

Table 41 UK imports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 3 372 | 1 086 | 261 | 218 | 610 | 1 018 | 1 254 | 1 616 | 1 106 | 1 206 | 1 188 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 236 | 148 | 204 | 1 004 | 1 230 | 1 570 | 1 078 | 1 200 | 1 184 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 25 | 70 | 406 | 14 | 24 | 46 | 28 | 6 | 4 |
| Other sharks | 109 | 35 | 927 | 595 | 195 | 186 | 509 | 433 | 679 | 441 | 680 |
| Total | 3 481 | 1 121 | 1 188 | 813 | 805 | 1 204 | 1 763 | 2 049 | 1 785 | 1 647 | 1 868 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 918 | 1 265 | 1 549 | 1 134 | 1 577 | 1 310 | 1 188 | 1 170 | 1 185 | 1 038 | 1 102 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 1 531 | 1 134 | 1 577 | 1 310 | 1 188 | 1 170 | 1 185 | 1 038 | 1 102 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 18 | - | - | - | - | - | - | - | - |
| Other sharks | 124 | 185 | 335 | 203 | 157 | 124 | 140 | 100 | 158 | 129 | 178 |
| Total | 1 042 | 1 450 | 1 884 | 1 337 | 1 734 | 1 434 | 1 328 | 1 270 | 1 343 | 1 167 | 1 280 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 | 31 | 12 | 13 | 19 | 55 | 2 | - | 1 | - | - |
| Other sharks | 14 | 6 | 8 | 1 | 17 | 3 | 4 | 20 | 1 | 8 | 20 |
| Total | 15 | 37 | 20 | 14 | 36 | 58 | 6 | 20 | 2 | 8 | 20 |
| Grand total | 4 538 | 2 608 | 3 092 | 2 164 | 2 575 | 2 696 | 3 097 | 3 339 | 3 130 | 2 822 | 3 168 |

Source: EUROSTAT and Sea Fish Industry Authority.

Table 42 UK imports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 2 420 | 1 011 | 392 | 458 | 800 | 1 096 | 3 933 | 3 252 | 2 392 | 3 009 | 3 069 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 345 | 325 | 373 | 1 063 | 3 889 | 3 214 | 2 346 | 3 002 | 3 064 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 47 | 133 | 427 | 33 | 44 | 38 | 46 | 7 | 5 |
| Other sharks | 119 | 48 | 989 | 873 | 402 | 288 | 1 245 | 888 | 1 801 | 956 | 1 201 |
| Total | 2 539 | 1 059 | 1 381 | 1 331 | 1 202 | 1 384 | 5 178 | 4 140 | 4 193 | 3 965 | 4 271 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 613 | 2 372 | 3 340 | 2 217 | 2 766 | 2 535 | 3 396 | 2 150 | 2 286 | 2 154 | 3 213 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 3 302 | 2 217 | 2 766 | 2 535 | 3 396 | 2 150 | 2 286 | 2 154 | 3 213 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 38 | - | - | - | - | - | - | - | - |
| Other sharks | 288 | 312 | 652 | 392 | 275 | 184 | 392 | 260 | 317 | 236 | 283 |
| Total | 1 901 | 2 684 | 3 992 | 2 609 | 3 041 | 2 719 | 3 788 | 2 410 | 2 603 | 2 390 | 3 497 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 2 | 19 | 14 | 43 | 26 | 129 | 11 | - | 1 | - | - |
| Other sharks | 39 | 34 | 22 | 4 | 45 | 6 | 23 | 63 | 1 | 36 | 60 |
| Total | 41 | 53 | 36 | 47 | 71 | 135 | 34 | 63 | 2 | 36 | 60 |
| Grand total | 4 481 | 3 796 | 5 409 | 3 987 | 4 314 | 4 238 | 9 000 | 6 613 | 6 798 | 6 391 | 7 828 |

Source. EUROSTAT and Sea Fish Industry Authority.

Table 43 UK exports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 4 750 | 3 892 | 2 209 | 2 835 | 2 527 | 1 841 | 1 043 | 586 | 657 | 500 | 537 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | <i>na</i> | <i>na</i> | 2 208 | 2 833 | 2 527 | 1 804 | 1 003 | 571 | 569 | 478 | 490 |
| Catsharks | <i>na</i> | <i>na</i> | 1 | 2 | 1 | 37 | 40 | 15 | 88 | 22 | 47 |
| Other sharks | 354 | 167 | 1 625 | 1 428 | 1 502 | 333 | 279 | 209 | 273 | 219 | 91 |
| Total | 5 104 | 4 059 | 3 834 | 4 263 | 4 029 | 2 174 | 1 322 | 795 | 930 | 719 | 628 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 943 | 1 010 | 183 | 157 | 194 | 128 | 519 | 1 174 | 665 | 387 | 245 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | <i>na</i> | <i>na</i> | 166 | 157 | 188 | 128 | 519 | 1 174 | 665 | 385 | 245 |
| Catsharks | <i>na</i> | <i>na</i> | 17 | - | 6 | - | - | - | - | 2 | - |
| Other sharks | 61 | 89 | 717 | 972 | 869 | 56 | 28 | 28 | 2 | 219 | 15 |
| Total | 1 004 | 1 099 | 900 | 1 129 | 1 063 | 184 | 547 | 1 202 | 667 | 606 | 260 |
| Frozen filets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 344 | 186 | 220 | 156 | 74 | 119 | 54 | 10 | 49 | 68 | 70 |
| Other sharks | 74 | 29 | 54 | 55 | 22 | - | 26 | 4 | 80 | 31 | 31 |
| Total | 418 | 215 | 274 | 211 | 96 | 119 | 80 | 14 | 129 | 99 | 101 |
| Grand total | 6 526 | 5 373 | 5 008 | 5 603 | 5 188 | 2 477 | 1 949 | 2 011 | 1 726 | 1 424 | 989 |

Source: EUROSTAT and Sea Fish Industry Authority.

Table 44 UK exports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 11 900 | 12 050 | 8 775 | 12 630 | 11 947 | 7 086 | 6 608 | 2 140 | 2 255 | 1 313 | 2 118 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 8 774 | 12 625 | 11 947 | 7 068 | 6 574 | 2 132 | 2 094 | 1 251 | 2 051 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 1 | 5 | - | 18 | 34 | 8 | 161 | 62 | 67 |
| Other sharks | 567 | 491 | 7 315 | 2 991 | 2 726 | 683 | 785 | 476 | 808 | 435 | 262 |
| Total | 12 467 | 12 541 | 16 090 | 15 621 | 14 673 | 7 769 | 7 393 | 2 616 | 3 063 | 1 748 | 2 380 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 829 | 2 042 | 668 | 566 | 629 | 371 | 3 140 | 3 322 | 2 733 | 1 326 | 800 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 629 | 566 | 620 | 371 | 3 140 | 3 322 | 2 733 | 1 321 | 800 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 39 | - | 9 | - | - | - | - | 5 | - |
| Other sharks | 139 | 182 | 1 889 | 2 054 | 2 070 | 137 | 180 | 150 | 8 | 263 | 27 |
| Total | 1 968 | 2 224 | 2 557 | 2 620 | 2 699 | 508 | 3 320 | 3 472 | 2 741 | 1 589 | 827 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 898 | 429 | 836 | 502 | 177 | 279 | 280 | 58 | 223 | 153 | 189 |
| Other sharks | 238 | 87 | 188 | 207 | 48 | | 190 | 17 | 270 | 128 | 120 |
| Total | 1 136 | 516 | 1 024 | 709 | 225 | 279 | 470 | 75 | 493 | 281 | 309 |
| Grand total | 15 571 | 15 281 | 19 671 | 18 950 | 17 597 | 8 556 | 11 183 | 6 163 | 6 297 | 3 618 | 3 516 |

Source: EUROSTAT and Sea Fish Industry Authority.

Table 45 UK imports of sharks by country of origin in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| USA | 667 | 705 | 1 289 | 1 075 | 1 429 | 1 121 | 1 592 | 1 468 | 1 552 | 1 571 | 1 591 |
| Ireland | 3 595 | 686 | 225 | 98 | 53 | 611 | 959 | 724 | 589 | 631 | 900 |
| Faeroe Is. | - | - | - | 11 | 6 | 31 | 180 | 167 | 298 | 200 | 310 |
| Canada | 96 | 465 | 469 | 135 | 246 | 213 | 71 | 114 | 60 | 83 | 74 |
| Oman | - | 3 | 3 | 1 | 2 | 4 | 8 | 21 | 24 | 11 | 69 |
| Spain | - | - | - | 9 | - | - | - | - | 10 | 52 | 67 |
| Iceland | - | 0 | - | 34 | 69 | 29 | 63 | 75 | 72 | 62 | 40 |
| Taiwan PC | 63 | 44 | 6 | 30 | - | - | 3 | - | 38 | 14 | 31 |
| Panama | - | - | - | - | - | - | - | - | 4 | 9 | 25 |
| France | 54 | 11 | 3 | 5 | 31 | 1 | 23 | 46 | 78 | 12 | 23 |
| Norway | - | 410 | 791 | 563 | 521 | 487 | 84 | 63 | 57 | 27 | 8 |
| Germany | 9 | 4 | 2 | 15 | 4 | 41 | - | 120 | 47 | 12 | 6 |
| India | - | 26 | 62 | 109 | 87 | 120 | 88 | 24 | 56 | 30 | 0 |
| Denmark | 26 | 107 | 76 | 39 | 32 | 3 | - | 281 | 17 | 1 | 0 |
| Sweden | - | - | - | - | - | - | - | 129 | 67 | 1 | - |
| Others | 28 | 147 | 166 | 40 | 95 | 35 | 26 | 107 | 161 | 106 | 24 |
| Total | 4 538 | 2 608 | 3 092 | 2 164 | 2 575 | 2 696 | 3 097 | 3 339 | 3 130 | 2 822 | 3 168 |

Source: EUROSTAT and Sea Fish Industry Authority.

Table 46 UK imports of sharks by country of origin in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| USA | 1 356 | 1 404 | 2 745 | 2 157 | 2 639 | 2 205 | 5 488 | 3 320 | 3 642 | 4 227 | 5 294 |
| Ireland | 2 584 | 527 | 207 | 129 | 60 | 668 | 1 946 | 947 | 662 | 624 | 1 086 |
| Faeroe Is. | - | - | - | 26 | 5 | 27 | 438 | 509 | 804 | 587 | 678 |
| Canada | 160 | 929 | 1 080 | 317 | 422 | 425 | 256 | 249 | 137 | 146 | 220 |
| Spain | - | - | - | 32 | - | - | - | - | 14 | 95 | 144 |
| Oman | - | 3 | 6 | 1 | 5 | 6 | 17 | 25 | 32 | 24 | 105 |
| Norway | - | 406 | 820 | 747 | 504 | 452 | 182 | 110 | 93 | 45 | 63 |
| Taiwan PC | 158 | 110 | 14 | 58 | - | - | 9 | - | 91 | 32 | 57 |
| Iceland | - | 1 | - | 92 | 243 | 82 | 252 | 81 | 114 | 93 | 51 |
| Panama | - | - | - | - | - | - | - | - | 8 | 8 | 28 |
| Germany | 50 | 24 | 5 | 37 | 13 | 92 | - | 174 | 58 | 14 | 13 |
| France | 87 | 21 | 14 | 17 | 47 | 6 | 83 | 135 | 251 | 54 | 12 |
| India | - | 44 | 137 | 207 | 154 | 199 | 212 | 92 | 133 | 69 | 1 |
| Denmark | 35 | 122 | 93 | 66 | 38 | 5 | 4 | 429 | 28 | 1 | 1 |
| Sweden | - | - | - | - | - | - | - | 198 | 88 | 1 | - |
| Others | 51 | 205 | 288 | 101 | 184 | 71 | 113 | 344 | 643 | 371 | 75 |
| Total | 4 481 | 3 796 | 5 409 | 3 987 | 4 314 | 4 238 | 9 000 | 6 613 | 6 798 | 6 391 | 7 828 |

Source: EUROSTAT and Sea Fish Industry Authority.

Table 47 UK exports of sharks by country of destination in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|
| France | 5 295 | 3 870 | 3 408 | 3 767 | 3 525 | 1 491 | 1 243 | 1 496 | 1 072 | 812 | 611 |
| Italy | 2 | 131 | 427 | 457 | 603 | 247 | 353 | 326 | 342 | 276 | 224 |
| Germany | 711 | 784 | 728 | 737 | 498 | 123 | 62 | 23 | 58 | 89 | 57 |
| Singapore | - | 32 | 67 | 92 | 85 | 11 | 12 | - | - | - | 27 |
| Belgium | 132 | 76 | 90 | 149 | 83 | 28 | 36 | 31 | 25 | 28 | 20 |
| Denmark | 5 | 13 | 10 | 17 | 3 | 1 | - | 6 | 1 | 20 | 20 |
| Norway | 26 | 37 | 53 | 71 | 19 | 8 | 1 | - | - | - | 15 |
| Netherlands | 113 | 102 | 57 | 65 | 93 | 7 | 19 | 8 | 19 | 18 | 13 |
| Ireland | 39 | 5 | 5 | 6 | 56 | 165 | 5 | 5 | - | 11 | 2 |
| Spain | 2 | 101 | 23 | 77 | 71 | 159 | 1 | - | 1 | 2 | 0 |
| Russia | - | - | - | - | - | - | - | - | - | 100 | - |
| Thailand | 187 | 186 | 127 | 116 | 116 | 107 | 145 | 108 | 123 | 41 | - |
| Hong Kong | 2 | 1 | - | - | - | - | - | - | 60 | - | - |
| Japan | - | - | 10 | - | - | - | 32 | 1 | 22 | - | - |
| Greece | - | - | - | - | - | 118 | 26 | - | 1 | - | - |
| Others | 12 | 35 | 3 | 49 | 36 | 12 | 14 | 7 | 2 | 27 | 0 |
| Total | 6 526 | 5 373 | 5 008 | 5 603 | 5 188 | 2 477 | 1 949 | 2 011 | 1 726 | 1 424 | 989 |

Source: EUROSTAT and Sea Fish Industry Authority.

Table 48 UK exports of sharks by country of destination in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|--------------|--------------|--------------|--------------|
| France | 12 618 | 11 341 | 13 195 | 12 744 | 11 386 | 5 136 | 7 060 | 3 932 | 3 686 | 2 109 | 1 893 |
| Italy | 7 | 645 | 2 556 | 2 459 | 3 353 | 1 103 | 2 631 | 1 487 | 1 436 | 897 | 1 126 |
| Germany | 1 856 | 1 959 | 2 844 | 2 378 | 1 210 | 370 | 349 | 127 | 291 | 172 | 155 |
| Singapore | - | 28 | 80 | 133 | 175 | 32 | 89 | - | - | - | 106 |
| Belgium | 424 | 274 | 367 | 535 | 337 | 118 | 227 | 118 | 76 | 54 | 85 |
| Denmark | 13 | 37 | 23 | 36 | 9 | 8 | - | 20 | 4 | 20 | 65 |
| Netherlands | 322 | 259 | 274 | 206 | 275 | 36 | 112 | 38 | 57 | 20 | 44 |
| Norway | 37 | 45 | 76 | 131 | 55 | 20 | 2 | - | - | - | 23 |
| Ireland | 47 | 11 | 23 | 15 | 71 | 812 | 6 | 42 | 1 | 2 | 9 |
| Spain | 17 | 419 | 85 | 123 | 302 | 333 | 2 | 3 | 4 | 2 | 0 |
| Thailand | 182 | 162 | 117 | 144 | 313 | 163 | 426 | 368 | 474 | 174 | - |
| Russia | - | - | - | - | - | - | - | - | - | 100 | - |
| Hong Kong | 20 | 11 | - | - | - | 1 | - | - | 187 | 100 | - |
| Japan | - | - | 10 | - | - | - | 27 | 1 | 71 | 44 | - |
| Greece | - | - | - | - | - | 384 | 146 | - | - | - | - |
| Others | 28 | 90 | 21 | 46 | 111 | 40 | 106 | 27 | 10 | 24 | 10 |
| Total | 15 571 | 15 281 | 19 671 | 18 950 | 17 597 | 8 556 | 11 183 | 6 163 | 6 297 | 3 618 | 3 516 |

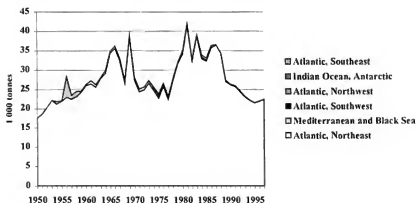
Source: EUROSTAT and Sea Fish Industry Authority.

In 1997 other major shark species reported by FAO statistics were "dogfish sharks nei" (200 tonnes), angelsharks/sand devils (3 tonnes). "Elasmobranch not identified" amounted to 270 tonnes and total and *rajiformes* to 10 990 tonnes

The most prevalent shark species caught by French vessels now are catsharks, mainly *Scyliorhinus canicula* with small amounts of *S. stellaris*, followed by picked dogfish. Catsharks are mainly caught as bycatch in trawler and longline fisheries, while picked dogfish are mostly captured by directed fisheries. Other shark species, such as porbeagles, are harvested either incidentally or in limited target fisheries. Catches of tope sharks, smooth-hounds (*Mustelus mustelus* and *M. asterias*), shortfin mako and thresher shark are reported. According to Kreuzer and Ahmed¹²⁶, tiger sharks are also caught. The expansion by large trawlers into deep-water areas in the last few years has increased the bycatch of deepwater shark species as leafscale gulper shark (*Centrophorus squamosus*) and Portuguese dogfish (*Centroscymnus coelolepis*)¹²⁷. This latter species is particularly important for its liver oil and squalene.

The vast majority (99.6%) of French elasmobranch catches come from the Northeast Atlantic, from the Faeroe Islands to the Azores but mainly in the Irish Sea, the English Channel, the Celtic Sea and the northern part of the Bay of Biscay. Only 0.4% comes from the Mediterranean and negligible quantities from the Southwest and Northwest Atlantic. No data are reported for landings in the Indian Ocean, where French tuna vessels primarily operate. Brittany and Normandy yield 80% of French production. The major ports involved are Lorient, Cherbourg, Concarneau and Douarnenez.

Figure 75 French elasmobranch catches by fishing areas in 1 000 tonnes (1950-1997)



Source: FAO-FIDI.

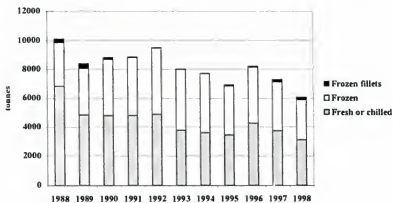
¹²⁶ KREUZER R., AHMED R., idem.

¹²⁷ OLIVER A., "An overview of the impacts of the biological status of sharks", discussion paper pursuant to CITES resolution conf. 9.17 for the 10th meeting of the Conference of the Parties, 9-20 June 1997, Harare, Zimbabwe, 1997.

7.3.2 Markets and trade

France is the largest consumer of shark and skate meat in Europe, provided by domestic landings and imports. French production of elasmobranch has been recorded in FAO statistics from 1976 to 1992 and has always been rather scanty. France is the second largest importer of shark meat in the world after Italy. French imports have increased substantially since 1976 when they were at 4 700 tonnes, worth US\$6 million. This growth was not regular and imports were particularly significant in the mid/late 1980s, peaking at 10 100 tonnes in 1988. A period of decline was experienced from 1992 to 1995, followed by growth of 18.8% in 1996, a decrease of 10.8% in 1997 and a further decline of 16.9% in 1998. According to EUROSTAT data, France is the principal importer of dogfish in Europe. As reported by DNSCE (Direction Nationale des Statistiques du Commerce Extérieur), in 1998 France imported nearly 6 100 tonnes of sharks, worth US\$17.7 million. Picked dogfish constituted 87.4% of these imports, 3.4% were catsharks and 9.2% were other shark species. The French began to consume picked dogfish after the Second World War. According to Gauld¹²⁸, this new French market for dogfish helped to expand and establish the fishery for picked dogfish by Norway and the UK, who were major suppliers to France until a few years ago. In 1975 France imported 4 600 tonnes of sharks, worth US\$5.6 million, of which 2 800 tonnes (US\$3.3 million) were from Norway and 1 400 tonnes (US\$1.8 million) from the UK. In the following years other significant exporters to France were Turkey, Ireland and Japan. The great bulk of French imports now come from the USA. In 1998 these amounted to 4 500 tonnes, worth US\$13.0 million, representing 73.3% of the total volume of shark imports. Other noteworthy suppliers were the UK (690 tonnes, US\$3.3 million), Canada (282 tonnes, US\$622 000), Faeroe Islands (116 tonnes, US\$ 331 000), Denmark (79 tonnes, US\$287 000) and Ireland (71 tonnes US\$127 000).

Figure 76 French shark imports by product forms in tonnes



Source: EUROSTAT/DNSCE.

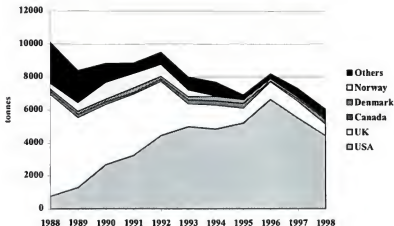
The USA steadily and substantially expanded its exports of shark to France until 1996. In 1988 they amounted to 800 tonnes, in 1992 4 500 tonnes and in 1996 6 700 tonnes, worth

¹²⁸ GAULD J.A., "The dogfish - an ocean rover" In Scottish Fisheries Bulletin, 47:13-16, 1982.

US\$15.4 million. In the following two years they substantially declined. In 1998 shark imports from the USA consisted of 1 990 tonnes fresh and 2 340 tonnes frozen picked dogfish, 1 tonne of frozen catsharks and 116 tonnes of dogfish and catshark fillets.

In 1998 the UK exported 690 tonnes of sharks to France of which nearly 650 tonnes were fresh (345 tonnes of picked dogfish, 185 tonnes of catsharks and 120 tonnes of other sharks) and 40 tonnes were frozen (10 tonnes as whole and 30 tonnes as fillets). In 1998 UK represented the major supplier of catsharks to France.

Figure 77 French shark imports by country of origin in tonnes

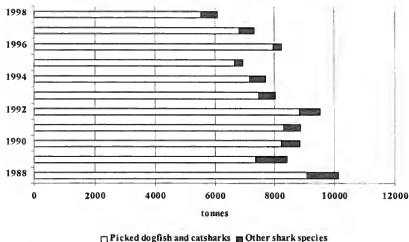


Source: EUROSTAT/ DNSCE.

In 1998 3 120 tonnes of fresh sharks were imported, worth US\$11.2 million, of which 2 560 tonnes (US\$9.6 million) were picked dogfish, 200 tonnes (US\$507 650) catsharks and 360 tonnes (US\$1.1 million) other sharks. Nearly 2 800 tonnes of frozen sharks were imported, worth US\$5.9 million, composed of 2 640 tonnes (US\$5.7 million) of picked dogfish, 9 tonnes (US\$15 900) of catsharks and 130 tonnes (US\$204 400) of other sharks. Frozen fillets imported amounted to 184 tonnes, worth US\$611 100: 121 tonnes of picked dogfish and catsharks and 63 tonnes of other sharks.

The great bulk of French imports consist of backs and whole (head-off, tail-off, skin-off, gutted) carcasses. Imports are very seasonal, with a peak in autumn. The main species favoured are picked dogfish, small spotted catshark and porbeagle, followed by smooth-hound, nursehound and tope sharks. Fresh dogfish is the preferred market option; frozen has a much lower price profile.

Figure 78 French shark imports by species in tonnes



Source: EUROSTAT/ DNSCE.

Sharks are often marketed in France under a number of euphemisms. Picked dogfish (*aiguillat* or *chien de mer*), smooth-hound (*emissole*) and tope sharks are usually commercialised as *chiens*. The skinless meat of these species and of small-spotted catshark and nursehound are marketed as *saumonette*, which sounds similar to salmon (*saumon*) in French. This name is due to their meat, skinless, head-off and gutted, being light pink. Small-spotted catsharks and nursehound are also marketed as, respectively, *petite roussette* and *grande roussette*. Porbeagle shark is usually sold gutted and head off and is commercialised as *taupe* or *veau de mer*. This species is sold mainly for export, to Italy primarily, as are tope sharks and smooth-hound.

Shark meat is consumed all over the country but with less demand in the centre and south. Normandy and Brittany, which harvest most French *Elasmobranchii*, are also the major consumers. Shark meat is consumed more in restaurants than at home. Shark meat is easily available in shops, supermarkets and hypermarkets. Its relatively accessible price and the absence of bones have favoured its use in catering for large groups such as schools, cafeterias and hospitals.

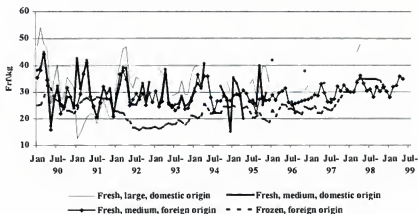
Fresh and frozen meat are preferred on the French market. Other shark products are not highly valued. The Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER) tried to promote the consumption of smoked meat but this was not a great success.

Three factors have an impact on dogfish prices in France: quality, competition between traders and their relative positions in supplying the Italian market, as dogfish obtains higher prices in Italy.

In November 1998, the cif prices for skinless backs of picked dogfish, origin USA, were US\$2.09/kg for grades more than 400 gr/pc and US\$2.38/kg for 400-800 gr/pc. In February 1999,

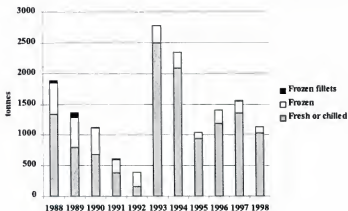
average wholesale prices in Rungis were US\$5.53/kg for medium dogfish, foreign origin and US\$5.61/kg for frozen dogfish, foreign origin. The following figure shows four price series for fresh and frozen dogfish at the wholesale market of Rungis (Paris) from January 1990 to May 1999.

Figure 79 Rungis wholesale prices for dogfish in FRF/kg



Source: MAREE.

Figure 80 French shark exports by product forms in tonnes

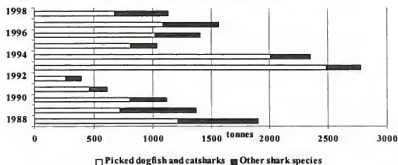


Source: EUROSTAT/ DNSCE.

In 1998 France exported 1 130 tonnes of sharks, valued at US\$5.2 million. The Italian market absorbs the great bulk of French shark exports as it pays the highest prices. France exports picked dogfish, catsharks, porbeagle, smooth-hound and tope sharks to Italy. In 1991 there was a substantial decrease in exports to Italy due to finding a high mercury content in the fish. French exports to Italy remained rather limited for several years and only exceeded 1 000 tonnes again in 1996. In 1998 France exported nearly 900 tonnes (US\$4.3 million) to Italy of which 870 tonnes were fresh sharks (400 tonnes of dogfish, 135 tonnes of catsharks and 335 tonnes of other sharks) and 14 tonnes were frozen (12 tonnes picked dogfish and 2 tonnes other shark fillets). Porbeagle are particularly appreciated in Italy and their export prices are higher than those of catsharks and picked dogfish.

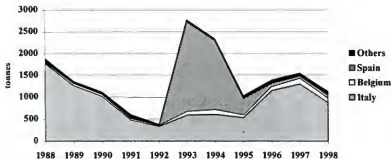
France also exports sharks to Belgium and Spain. Exports to Spain exceeded 2 000 tonnes in 1993 but this has declined to only 73 tonnes in 1998. There have also been re-exports of imported picked dogfish to Italy and Spain since 1994.

Figure 81 French shark exports by species in tonnes



Source: EUROSTAT/ DNSCE.

Figure 82 French shark exports by country of destination in tonnes



Source: EUROSTAT/ DNSCE.

There is demand for shark fins among the population of Chinese origin. Fins are available in France as dried fin noodles, dried fin products, and canned fin soup. These products are imported from Asian countries, mainly Singapore and Hong Kong.

Shark cartilage capsules have been introduced to the French market from the USA.

French companies use shark liver oil and squalene in the manufacture of cosmetic and pharmaceutical products. Liver oil is used in the production of perfumery and cosmetics such as milk, lotions, creams and oil for the skin and hair.

Shark leather is used in the production of luxury items such as handbags, wallets and jewellery.

Table 49 French elasmobranch catches by species in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Dogfishes and hounds nei | - | - | - | - | - | - | - | - | - | - |
| Cuckoo ray | - | - | - | - | - | - | - | - | - | - |
| Raja rays nei | 13 400 | 13 400 | 13 000 | 14 300 | 13 600 | 14 800 | 15 100 | 15 100 | 15 100 | 15 100 |
| Thornback ray | - | - | - | - | - | - | - | - | - | - |
| Picked dogfish | - | - | - | - | - | - | - | - | - | - |
| Spotted ray | - | - | - | - | - | - | - | - | - | - |
| Smooth- hounds nei | - | - | - | - | - | - | - | - | - | - |
| Tope shark | - | - | - | - | - | - | - | - | - | - |
| Longnosed skate | - | - | - | - | - | - | - | - | - | - |
| Blue skate | - | - | - | - | - | - | - | - | - | - |
| Blue shark | - | - | - | - | - | - | - | - | - | - |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, etc. nei | 4 200 | 5 200 | 7 400 | 7 900 | 8 300 | 7 300 | 13 200 | 8 500 | 9 400 | 9 400 |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | - | - |
| Rays, stingrays, mantas nei | - | - | - | - | - | - | - | - | - | - |
| Shagreen ray | - | - | - | - | - | - | - | - | - | - |
| Torpedo rays | - | - | - | - | - | - | - | - | - | - |
| Angelsharks, sand devils nei | - | - | - | - | - | - | - | - | - | - |
| Eagle rays | - | - | - | - | - | - | - | - | - | - |
| Basking shark | - | - | - | - | - | - | - | - | - | - |
| Total | 17 600 | 18 600 | 20 400 | 22 200 | 21 900 | 22 100 | 28 300 | 23 600 | 24 500 | 24 500 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Dogfishes and hounds nei | - | - | - | - | - | - | - | - | - | - |
| Cuckoo ray | - | - | - | - | - | - | - | - | - | - |
| Raja rays nei | 16 500 | 17 000 | 15 600 | 15 800 | 15 300 | 15 800 | 15 800 | 14 800 | 14 400 | 15 300 |
| Thornback ray | - | - | - | - | - | - | - | - | - | - |
| Picked dogfish | - | - | - | - | - | - | - | - | - | - |
| Spotted ray | - | - | - | - | - | - | - | - | - | - |
| Smooth- hounds nei | - | - | - | - | - | - | - | - | - | - |
| Tope shark | - | - | - | - | - | - | - | - | - | - |
| Longnosed skate | - | - | - | - | - | - | - | - | - | - |
| Blue skate | - | - | - | - | - | - | - | - | - | - |
| Blue shark | - | - | - | - | - | - | - | - | - | - |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, etc. nei | 9 800 | 10 300 | 10 700 | 12 300 | 14 200 | 18 800 | 20 200 | 17 900 | 12 600 | 23 400 |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | - | - |
| Rays, stingrays, mantas nei | - | - | - | - | 400 | 300 | 300 | 400 | 400 | 400 |
| Shagreen ray | - | - | - | - | - | - | - | - | - | - |
| Torpedo rays | - | - | - | - | - | - | - | - | - | - |
| Angelsharks, sand devils nei | - | - | - | - | - | - | - | - | - | - |
| Eagle rays | - | - | - | - | - | - | - | - | - | - |
| Basking shark | - | - | - | - | - | - | - | - | - | - |
| Total | 26 300 | 27 300 | 26 300 | 28 100 | 29 900 | 34 900 | 36 300 | 33 100 | 27 400 | 39 100 |

Table 49 French elasmobranch catches by species in tonnes (continued)

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Dogfishes and hounds nei | - | - | - | - | - | - | - | - | 3 676 | 5 621 |
| Cuckoo ray | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 479 |
| Raja rays nei | 13 200 | 13 300 | 12 500 | 13 265 | 11 972 | 11 646 | 12 035 | 12 125 | 10 584 | 9 574 |
| Thornback ray | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 583 | 2 260 |
| Picked dogfish | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 098 | 9 066 |
| Spotted ray | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94 | 80 |
| Smooth- hounds nei | - | - | - | - | - | - | - | - | 37 | 22 |
| Tope shark | - | - | - | - | - | - | - | - | - | - |
| Longnosed skate | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blue skate | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 983 | 306 |
| Blue shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 12 |
| Porbeagle | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 833 | 1 092 |
| Sharks, rays, skates, etc. nei | 14 600 | 11 500 | 12 800 | 13 700 | 13 285 | 11 982 | 14 370 | 10 963 | 2 564 | 2 835 |
| Dogfish sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 96 | 481 |
| Rays, stingrays, mantas nei | 400 | 400 | 400 | 400 | 325 | 303 | 259 | 201 | 237 | 96 |
| Shagreen ray | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Torpedo rays | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Angelsharks, sand devils nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 19 |
| Eagle rays | - | - | - | - | - | - | - | - | - | - |
| Basking shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 28 200 | 25 200 | 25 700 | 27 365 | 25 582 | 23 931 | 26 664 | 23 289 | 27 813 | 31 943 |
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Dogfishes and hounds nei | 5 475 | - | 6 318 | 7 133 | 5 974 | 6 017 | 7 519 | 6 767 | 7 707 | 6 292 |
| Cuckoo ray | 493 | - | 1 642 | 2 735 | 3 948 | 5 835 | 5 862 | 5 315 | 5 145 | 5 283 |
| Raja rays nei | 10 299 | 21 744 | 7 343 | 7 741 | 7 059 | 4 029 | 4 592 | 4 859 | 5 428 | 4 098 |
| Thornback ray | 1 951 | - | 3 006 | 2 017 | 1 910 | 3 417 | 3 544 | 3 079 | 2 970 | 2 553 |
| Picked dogfish | 11 627 | 14 259 | 12 006 | 14 901 | 12 474 | 11 109 | 10 941 | 13 523 | 9 892 | 5 701 |
| Spotted ray | 0 | - | 115 | 200 | 438 | 939 | 1 180 | 757 | 943 | 896 |
| Smooth- hounds nei | 24 | 11 | 9 | 356 | 197 | 190 | 309 | 351 | 295 | 274 |
| Tope shark | - | - | - | 1 669 | 478 | 422 | 1 257 | 602 | 705 | 465 |
| Longnosed skate | 0 | - | 19 | 104 | 102 | 71 | - | 200 | 94 | 143 |
| Blue skate | 259 | - | 196 | 144 | 177 | 326 | 438 | 386 | 356 | 376 |
| Blue shark | 12 | - | 9 | 8 | 14 | 39 | 50 | 67 | 91 | 83 |
| Porbeagle | 896 | 768 | 198 | 792 | 411 | 254 | 260 | 280 | 446 | 351 |
| Sharks, rays, skates, etc. nei | 3 445 | 4 999 | 1 468 | 440 | 316 | 254 | 245 | 243 | 216 | 318 |
| Dogfish sharks nei | 201 | - | 173 | 252 | 61 | 93 | 90 | 101 | 27 | 237 |
| Rays, stingrays, mantas nei | 311 | 252 | 279 | 271 | 263 | 13 | 10 | 6 | 0 | 215 |
| Shagreen ray | 0 | - | - | 372 | 113 | 89 | 43 | 67 | 63 | 88 |
| Torpedo rays | 0 | 0 | 0 | 0 | 1 | 6 | 11 | 1 | 4 | 14 |
| Angelsharks, sand devils nei | 25 | - | 20 | 15 | 14 | 31 | 18 | 18 | 15 | 10 |
| Eagle rays | 8 | - | - | 21 | 11 | 9 | 9 | 12 | 3 | 9 |
| Basking shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 35 026 | 42 033 | 32 801 | 39 171 | 33 961 | 33 143 | 36 378 | 36 634 | 34 400 | 27 406 |

Table 49 French elasmobranch catches by species in tonnes (continued)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Dogfishes and hounds nei | 6 145 | 5 995 | 5 248 | 5 035 | 5 842 | 7 418 | 7 790 | 7 795 |
| Cuckoo ray | 4 984 | 4 353 | 3 676 | 3 058 | 3 371 | 3 762 | 4 076 | 4 084 |
| Raja rays nei | 4 474 | 4 368 | 3 709 | 3 815 | 3 384 | 3 183 | 3 344 | 3 354 |
| Thornback ray | 2 608 | 2 618 | 2 255 | 1 754 | 1 584 | 1 749 | 1 767 | 1 763 |
| Picked dogfish | 4 144 | 3 553 | 2 435 | 1 940 | 1 687 | 1 349 | 1 378 | 1 734 |
| Spotted ray | 933 | 998 | 1 172 | 1 127 | 959 | 925 | 980 | 983 |
| Smooth- hounds nei | 277 | 348 | 305 | 305 | 358 | 414 | 574 | 582 |
| Tope shark | 415 | 454 | 279 | 299 | 309 | 317 | 350 | 411 |
| Longnosed skate | 162 | 265 | 393 | 396 | 354 | 359 | 349 | 354 |
| Blue skate | 391 | 321 | 266 | 254 | 249 | 285 | 308 | 304 |
| Blue shark | 135 | 193 | 276 | 329 | 358 | 266 | 302 | 285 |
| Porbeagle | 561 | 309 | 496 | 643 | 828 | 565 | 305 | 276 |
| Sharks, rays, skates, etc. nei | 745 | 1 278 | 3 291 | 3 628 | 2 598 | 752 | 289 | 266 |
| Dogfish sharks nei | 150 | 669 | 623 | 374 | 200 | 174 | 119 | 199 |
| Rays, stingrays, mantas nei | 174 | 198 | 172 | 135 | 108 | 20 | 84 | 78 |
| Shagreen ray | 112 | 75 | 88 | 77 | 59 | 51 | 47 | 50 |
| Torpedo rays | 18 | 19 | 15 | 22 | 23 | 20 | 20 | 17 |
| Angelsharks, sand devils nei | 7 | 5 | 1 | 3 | 3 | 2 | 1 | 3 |
| Eagle rays | 4 | 5 | 5 | 4 | 3 | 2 | 1 | 1 |
| Basking shark | 0 | 0 | 0 | 0 | 0 | - | - | - |
| Total | 26 439 | 26 024 | 24 705 | 23 198 | 22 277 | 21 613 | 22 084 | 22 539 |

Source: FAO - FIDI.

Table 50 French elasmobranch catches by fishing areas in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Atlantic, Northeast | 17 600 | 18 600 | 20 400 | 22 200 | 21 200 | 22 000 | 23 000 | 22 500 | 23 100 | 24 300 |
| Mediterranean and Black Sea | - | - | - | - | 700 | 100 | 5 300 | 1 100 | 1 400 | 200 |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | - | - |
| Indian Ocean, Antarctic | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | - | - |
| Total | 17 600 | 18 600 | 20 400 | 22 200 | 21 900 | 22 100 | 28 300 | 23 600 | 24 500 | 24 500 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Atlantic, Northeast | 26 000 | 26 400 | 25 600 | 27 800 | 29 100 | 34 300 | 35 600 | 32 400 | 26 600 | 38 300 |
| Mediterranean and Black Sea | 300 | 900 | 700 | 300 | 800 | 600 | 700 | 700 | 800 | 800 |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indian Ocean, Antarctic | - | - | - | - | 0 | 0 | 0 | 0 | - | - |
| Atlantic, Southeast | - | - | - | - | 0 | 0 | 0 | 0 | - | - |
| Total | 26 300 | 27 300 | 26 300 | 28 100 | 29 900 | 34 900 | 36 300 | 33 100 | 27 400 | 39 100 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Atlantic, Northeast | 27 400 | 24 400 | 24 900 | 26 600 | 24 682 | 22 696 | 25 801 | 22 387 | 27 153 | 31 497 |
| Mediterranean and Black Sea | 800 | 800 | 800 | 700 | 642 | 529 | 481 | 347 | 475 | 280 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Northwest | 0 | 0 | 0 | 65 | 258 | 706 | 382 | 555 | 185 | 166 |
| Indian Ocean, Antarctic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Southeast | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| Total | 28 200 | 25 200 | 25 700 | 27 365 | 25 582 | 23 931 | 26 664 | 23 289 | 27 813 | 31 943 |
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Atlantic, Northeast | 34 012 | 41 372 | 32 309 | 38 621 | 32 898 | 32 343 | 35 701 | 36 448 | 34 266 | 27 015 |
| Mediterranean and Black Sea | 543 | 454 | 492 | 495 | 422 | 9 | 14 | 6 | - | 296 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Northwest | 471 | 207 | 0 | 54 | 624 | 787 | 660 | 180 | 134 | 95 |
| Indian Ocean, Antarctic | - | - | - | 1 | 17 | 4 | 3 | 0 | 0 | 0 |
| Atlantic, Southeast | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Total | 35 026 | 42 033 | 32 801 | 39 171 | 33 961 | 33 143 | 36 378 | 36 634 | 34 400 | 27 406 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Atlantic, Northeast | 26 199 | 25 784 | 24 473 | 23 042 | 22 150 | 21 593 | 21 965 | 22 454 | | |
| Mediterranean and Black Sea | 237 | 240 | 232 | 156 | 105 | 15 | 110 | 82 | | |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 20 | 5 | 9 | 3 | | |
| Atlantic, Northwest | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Indian Ocean, Antarctic | 0 | 0 | - | 0 | 2 | 0 | 0 | 0 | | |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | | |
| Total | 26 439 | 26 024 | 24 705 | 23 198 | 22 277 | 21 613 | 22 084 | 22 539 | | |

Source: FAO - FIDI.

Table 51 French imports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 6 606 | 4 674 | 4 688 | 4 541 | 4 645 | 3 520 | 3 337 | 3 339 | 4 122 | 3 395 | 2 761 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | <i>na</i> | <i>na</i> | 4 625 | 4 439 | 4 327 | 3 217 | 3 207 | 3 281 | 3 950 | 3 181 | 2 561 |
| Catsharks | <i>na</i> | <i>na</i> | 63 | 102 | 318 | 303 | 130 | 58 | 172 | 214 | 200 |
| Other sharks | 234 | 169 | 108 | 274 | 258 | 266 | 269 | 115 | 168 | 358 | 363 |
| Total | 6 840 | 4 843 | 4 796 | 4 815 | 4 903 | 3 786 | 3 606 | 3 454 | 4 290 | 3 753 | 3 124 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 2 429 | 2 593 | 3 494 | 3 739 | 4 172 | 3 949 | 3 816 | 3 241 | 3 758 | 3 261 | 2 646 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | <i>na</i> | <i>na</i> | 3 494 | 3 735 | 4 172 | 3 948 | 3 786 | 3 199 | 3 703 | 3 238 | 2 637 |
| Catsharks | <i>na</i> | <i>na</i> | - | 4 | - | 1 | 30 | 42 | 55 | 23 | 9 |
| Other sharks | 590 | 640 | 397 | 272 | 406 | 275 | 282 | 143 | 100 | 119 | 130 |
| Total | 3 019 | 3 233 | 3 891 | 4 011 | 4 578 | 4 224 | 4 098 | 3 384 | 3 858 | 3 380 | 2 776 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 49 | 89 | 36 | 21 | 17 | - | 12 | 83 | 74 | 159 | 121 |
| Other sharks | 219 | 257 | 123 | 30 | 23 | 16 | - | 20 | 11 | 31 | 63 |
| Total | 268 | 346 | 159 | 51 | 40 | 16 | 12 | 103 | 85 | 190 | 184 |
| Grand total | 10 127 | 8 422 | 8 846 | 8 877 | 9 521 | 8 026 | 7 716 | 6 941 | 8 233 | 7 323 | 6 084 |

Source: EUROSTAT/DNSCE.

Table 52 French imports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 14 420 | 12 825 | 15 256 | 15 194 | 14 782 | 11 050 | 18 749 | 11 703 | 13 591 | 11 280 | 10 125 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | 15 168 | 15 066 | 13 994 | 10 097 | 18 067 | 11 537 | 13 246 | 10 677 | 9 617 |
| Catsharks | na | na | 88 | 128 | 788 | 953 | 682 | 166 | 345 | 603 | 508 |
| Other sharks | 383 | 285 | 267 | 605 | 475 | 1 293 | 1 329 | 387 | 537 | 897 | 1 066 |
| Total | 14 803 | 13 110 | 15 523 | 15 799 | 15 257 | 12 343 | 20 078 | 12 090 | 14 128 | 12 177 | 11 191 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 4 398 | 4 448 | 6 742 | 6 091 | 6 833 | 7 076 | 9 793 | 4 910 | 5 437 | 4 823 | 5 684 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | 6 742 | 6 086 | 6 833 | 7 074 | 9 713 | 4 841 | 5 335 | 4 787 | 5 668 |
| Catsharks | na | na | - | 5 | - | 2 | 80 | 69 | 102 | 36 | 16 |
| Other sharks | 2 040 | 1 969 | 1 444 | 1 085 | 1 877 | 766 | 1 550 | 477 | 333 | 152 | 204 |
| Total | 6 438 | 6 417 | 8 186 | 7 176 | 8 710 | 7 842 | 11 343 | 5 387 | 5 770 | 4 975 | 5 888 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 97 | 162 | 115 | 68 | 36 | - | 55 | 263 | 208 | 413 | 425 |
| Other sharks | 819 | 809 | 523 | 175 | 57 | 35 | 4 | 55 | 27 | 69 | 186 |
| Total | 916 | 971 | 638 | 243 | 93 | 35 | 59 | 318 | 235 | 482 | 611 |
| Grand total | 22 157 | 20 498 | 24 347 | 23 218 | 24 060 | 20 220 | 31 480 | 17 795 | 20 133 | 17 634 | 17 690 |

Source: EUROSTAT/DNSCE.

Table 53 French exports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 135 | 634 | 604 | 354 | 149 | 2 258 | 1 783 | 717 | 866 | 948 | 596 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 550 | 327 | 138 | 2 232 | 1 684 | 682 | 773 | 772 | 453 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 54 | 27 | 11 | 26 | 99 | 35 | 93 | 176 | 143 |
| Other sharks | 206 | 163 | 75 | 24 | 8 | 241 | 303 | 219 | 325 | 404 | 433 |
| Total | 1 341 | 797 | 679 | 378 | 157 | 2 499 | 2 086 | 936 | 1 191 | 1 352 | 1 029 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 69 | 85 | 201 | 107 | 112 | 228 | 224 | 97 | 153 | 142 | 76 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 201 | 103 | 111 | 207 | 224 | 90 | 153 | 141 | 76 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | 4 | 1 | 21 | - | 7 | - | 1 | 0 |
| Other sharks | 442 | 397 | 230 | 106 | 124 | 49 | 37 | 5 | 59 | 56 | 26 |
| Total | 511 | 482 | 431 | 213 | 236 | 277 | 261 | 102 | 212 | 198 | 102 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 10 | - | 1 | - | - | - | - | - | - | - | 2 |
| Other sharks | 37 | 90 | 9 | 21 | - | 1 | - | - | 2 | 14 | - |
| Total | 47 | 90 | 10 | 21 | - | 1 | - | - | 2 | 14 | 2 |
| Grand total | 1 899 | 1 369 | 1 120 | 612 | 393 | 2 777 | 2 347 | 1 038 | 1 405 | 1 564 | 1 133 |

Source: EUROSTAT/DNSCE.

Table 54 French exports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 6 179 | 3 503 | 4 224 | 2 449 | 1 214 | 5 514 | 7 921 | 2 897 | 3 791 | 3 849 | 2 891 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 3 940 | 2 336 | 1 157 | 5 450 | 7 568 | 2 751 | 3 352 | 3 188 | 2 240 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 284 | 113 | 57 | 64 | 353 | 146 | 439 | 661 | 651 |
| Other sharks | 1 043 | 873 | 606 | 165 | 48 | 1 389 | 2 452 | 1 199 | 1 583 | 1 799 | 2 032 |
| Total | 7 222 | 4 376 | 4 830 | 2 614 | 1 262 | 6 903 | 10 373 | 4 096 | 5 374 | 5 648 | 4 923 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 130 | 177 | 533 | 217 | 246 | 479 | 756 | 238 | 338 | 281 | 222 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 533 | 211 | 243 | 472 | 756 | 228 | 338 | 281 | 222 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | 6 | 3 | 7 | - | 10 | - | - | 0 |
| Other sharks | 1 300 | 1 768 | 1 225 | 405 | 783 | 242 | 195 | 22 | 338 | 254 | 73 |
| Total | 1 430 | 1 945 | 1 758 | 622 | 1 029 | 721 | 951 | 260 | 676 | 535 | 295 |
| Frozen filets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 25 | - | 3 | - | - | - | - | - | - | - | 6 |
| Other sharks | 128 | 397 | 19 | 166 | - | 2 | - | - | 4 | 23 | - |
| Total | 153 | 397 | 22 | 166 | - | 2 | - | - | 4 | 23 | 6 |
| Grand total | 8 805 | 6 718 | 6 610 | 3 402 | 2 291 | 7 626 | 11 324 | 4 356 | 6 054 | 6 206 | 5 224 |

Source: EUROSTAT/DNSCE.

Table 55 French imports of sharks by country of origin in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| USA | 774 | 1 304 | 2 692 | 3 260 | 4 467 | 4 990 | 4 849 | 5 218 | 6 652 | 5 526 | 4 458 |
| UK | 6 197 | 4 248 | 3 645 | 3 706 | 3 277 | 1 391 | 1 444 | 906 | 1 062 | 993 | 690 |
| Canada | 173 | 188 | 163 | 98 | 136 | 230 | 263 | 281 | 62 | 151 | 282 |
| Faeroe Is. | - | - | 2 | 8 | 22 | - | - | - | - | - | 116 |
| Denmark | 138 | 179 | 157 | 272 | 170 | 199 | 274 | 225 | 126 | 114 | 79 |
| Ireland | 781 | 291 | 83 | 172 | 78 | 152 | 103 | 84 | 95 | 117 | 71 |
| Spain | 8 | 49 | - | - | - | 4 | 8 | 3 | 13 | 61 | 53 |
| Orman | - | - | - | 2 | 28 | 66 | 18 | 21 | 20 | 55 | 51 |
| Venezuela | - | - | - | - | - | 2 | - | - | - | 50 | 47 |
| Norway | 335 | 513 | 1 018 | 880 | 725 | 405 | 8 | - | - | 24 | 43 |
| New Zealand | 143 | 53 | 25 | 40 | 53 | 146 | 93 | 26 | 5 | 18 | 16 |
| Netherlands | 96 | 109 | 50 | 39 | 59 | 15 | 148 | 19 | 36 | 43 | 15 |
| Belgium | 22 | 38 | 20 | 12 | 31 | 29 | 67 | 26 | 30 | 48 | 12 |
| Germany | 8 | - | 32 | - | 6 | 87 | 105 | 3 | 31 | 3 | 0 |
| Japan | 442 | 445 | 241 | 128 | 83 | 108 | 33 | 7 | 51 | - | 0 |
| Singapore | - | 12 | 34 | 12 | 129 | 47 | 155 | 50 | - | - | - |
| Turkey | 595 | 557 | 367 | 69 | 1 | 75 | 72 | - | - | - | - |
| Chile | 50 | 116 | 116 | 15 | - | 4 | - | - | - | - | - |
| Others | 365 | 320 | 201 | 164 | 256 | 76 | 76 | 72 | 50 | 120 | 150 |
| Total | 10 127 | 8 422 | 8 846 | 8 877 | 9 521 | 8 026 | 7 716 | 6 941 | 8 233 | 7 323 | 6 083 |

Source: EUROSTAT/DNSCE.

Table 56 French imports of sharks by country of origin in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| USA | 1 509 | 2 352 | 5 308 | 5 338 | 8 790 | 11 218 | 17 104 | 12 752 | 15 373 | 12 649 | 13 020 |
| UK | 13 619 | 11 855 | 13 221 | 12 557 | 10 683 | 5 284 | 8 936 | 3 257 | 3 437 | 3 337 | 2 388 |
| Canada | 311 | 315 | 298 | 150 | 223 | 401 | 635 | 396 | 95 | 210 | 622 |
| Faeroe Is. | - | - | 3 | 51 | 29 | - | - | - | - | - | 331 |
| Denmark | 420 | 503 | 616 | 1 130 | 630 | 551 | 1 275 | 678 | 429 | 418 | 287 |
| Spain | 19 | 86 | - | - | - | 8 | 30 | 17 | 50 | 133 | 131 |
| Ireland | 933 | 401 | 136 | 230 | 113 | 166 | 212 | 110 | 124 | 193 | 127 |
| Oman | - | - | - | 2 | 57 | 128 | 42 | 31 | 47 | 136 | 111 |
| Norway | 879 | 903 | 1 748 | 2 112 | 1 203 | 722 | 30 | - | - | 12 | 98 |
| Netherlands | 316 | 315 | 200 | 185 | 161 | 87 | 646 | 41 | 76 | 69 | 41 |
| Venezuela | - | - | - | - | - | 4 | - | - | - | 41 | 38 |
| Belgium | 46 | 97 | 53 | 33 | 57 | 53 | 362 | 37 | 99 | 137 | 26 |
| New Zealand | 247 | 90 | 47 | 66 | 88 | 261 | 254 | 39 | 8 | 26 | 29 |
| Germany | 24 | - | 60 | - | 10 | 411 | 222 | 4 | 47 | 12 | 2 |
| Japan | 1 778 | 1 667 | 1 099 | 786 | 436 | 342 | 214 | 35 | 234 | - | 1 |
| Singapore | - | 46 | 144 | 59 | 663 | 196 | 1 075 | 230 | - | - | - |
| Turkey | 1 037 | 905 | 587 | 109 | 5 | 127 | 222 | - | - | - | - |
| Chile | 79 | 180 | 200 | 22 | - | 7 | - | - | - | - | - |
| Others | 940 | 783 | 627 | 388 | 912 | 254 | 221 | 168 | 114 | 261 | 438 |
| Total | 22 157 | 20 498 | 24 347 | 23 218 | 24 060 | 20 220 | 31 480 | 17 795 | 20 133 | 17 634 | 17 690 |

Source: EUROSTAT/DNSCE.

Table 57 French exports of sharks by country of destination in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|--------------|--------------|--------------|------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Italy | 1 782 | 1 270 | 1 022 | 486 | 340 | 601 | 619 | 544 | 1 156 | 1 306 | 883 |
| Belgium | 32 | 53 | 46 | 39 | 26 | 85 | 108 | 63 | 87 | 133 | 95 |
| Spain | - | 6 | 2 | - | - | 2 049 | 1 581 | 371 | 80 | 60 | 73 |
| Netherlands | 11 | 12 | 3 | - | 3 | 21 | 16 | 13 | 15 | 12 | 21 |
| Germany | 26 | 3 | 14 | 1 | - | 12 | 17 | 17 | 11 | 17 | 20 |
| UK | 32 | 24 | 12 | 32 | 14 | 1 | 1 | 16 | 39 | 4 | 14 |
| Others | 16 | 1 | 21 | 54 | 10 | 8 | 5 | 14 | 17 | 32 | 28 |
| Total | 1 899 | 1 369 | 1 120 | 612 | 393 | 2 777 | 2 347 | 1 038 | 1 405 | 1 564 | 1 134 |

Source: EUROSTAT/DNSCE.

Table 58 French exports of sharks by country of destination in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|--------------|
| Italy | 8 509 | 6 473 | 6 290 | 3 085 | 2 122 | 2 565 | 4 736 | 2 738 | 5 266 | 5 477 | 4 277 |
| Belgium | 72 | 145 | 116 | 108 | 77 | 228 | 493 | 242 | 258 | 338 | 358 |
| Spain | - | 19 | 8 | 2 | 3 | 4 700 | 5 826 | 1 129 | 262 | 194 | 262 |
| UK | 67 | 56 | 69 | 95 | 45 | 6 | 9 | 22 | 76 | 25 | 99 |
| Netherlands | 15 | 2 | 13 | - | 6 | 10 | 66 | 71 | 79 | 54 | 85 |
| Germany | 102 | 9 | 75 | 7 | 3 | 74 | 148 | 95 | 58 | 71 | 82 |
| Others | 40 | 14 | 39 | 105 | 35 | 43 | 46 | 59 | 55 | 47 | 60 |
| Total | 8 805 | 6 718 | 6 610 | 3 402 | 2 291 | 7 626 | 11 324 | 4 356 | 6 054 | 6 206 | 5 223 |

Source: EUROSTAT/DNSCE.

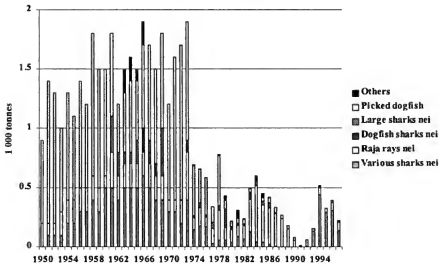
7.4 GERMANY

7.4.1 Catches

German catches of chondrichthyans have never been very abundant and they have declined from 900 tonnes in 1950 to more than 220 tonnes in 1997. In the period 1952-73 landings were more sizeable, fluctuating around 1 500 tonnes per year and peaking at 1 900 tonnes in 1966 and 1973. In 1974 they fell to less than 700 tonnes and then they declined until 1991 when they reached a low of 14 tonnes. In the last few years catches have increased up to 520 tonnes in 1994.

In 1997, 140 tonnes of these catches were recorded as "various sharks nei" (*Selachimorpha (Pleurotremata)*), 12 tonnes as "dogfish not identified" and 74 tonnes as batoid fishes. Previously, much of the German elasmobranch catch was composed of picked dogfish, with a peak of 1 300 tonnes in 1972, and there were also small amounts of "large sharks" (*Squaliformes*).

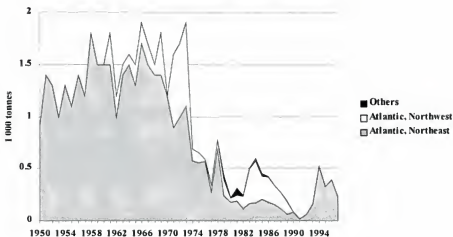
Figure 83 German elasmobranch catches by species in 1 000 tonnes (1950-1997)



Source: FAO - FIDI.

In 1997 all German chondrichthyan catches were reported from the Northeast Atlantic. In the past there were also significant captures in the Northwest Atlantic.

Figure 84 German elasmobranch catches by fishing areas in 1 000 tonnes (1950-1997)



Source: FAO - FIDI.

Historically there were no German fisheries targeted on sharks. *Elasmobranchii* were usually captured as bycatch, mainly by bottom trawls or factory trawlers, and discarded at sea or processed for fishmeal on board factory trawlers. Only few selected species, such as picked dogfish and porbeagle, were regularly retained and sold for human consumption. Nowadays, there are reports of new fisheries trawling in deep-waters, which capture limited quantities of deep-water sharks as bycatch. These sharks are mainly *squaloids* and are either discarded, processed for fishmeal or exported to other European countries for human consumption¹²⁹.

Small recreational fisheries for sharks exist, particularly in the southern North Sea around the island of Helgoland. Picked dogfish, small-spotted catshark, smooth-hound and tope shark are the major species landed.

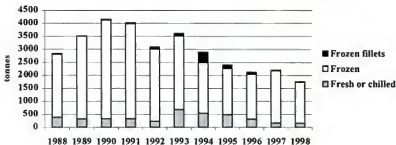
7.4.2 Markets and trade

Although elasmobranch catches play a minor role in the German fishing industry, imports of sharks are quite important even if they have decreased substantially in the last few years. According to FAO statistics, German imports were higher in the early 1980s, peaking at 5 700 tonnes in 1984. According to EUROSTAT figures, in 1998 they were 1 760 tonnes, worth US\$5.2 million. Picked dogfish and catsharks composed 23.2% of the volume and value of these. The great bulk of the imports consisted of whole frozen sharks (1 580 tonnes, worth US\$4.4 million) of which 280 tonnes (US\$713 200) were picked dogfish, 1 300 tonnes (US\$3.7 million) of other sharks, plus negligible quantities of catsharks. Imports of fresh sharks only amounted to 160 tonnes (US\$646 500) of which 90 tonnes (US\$364 200) were picked dogfish, 38 tonnes

¹²⁹ OLIVER A., idem.

(US\$188 600) other sharks and 30 tonnes (US\$93 700) catsharks. The decrease in imports of frozen shark has been noticeable while fresh shark imports have remained fairly stable. Imports of fillets were 30 tonnes in 1998, valued at US\$112 400. These have risen recently, to peak at more than 410 tonnes in 1994 to decrease since then.

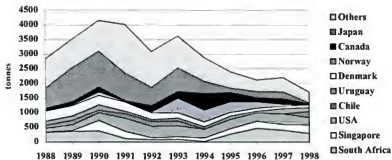
Figure 85 German shark imports by product forms in tonnes



Source: EUROSTAT

In 1998 South Africa was the main supplier of sharks to Germany, with 302 tonnes, worth US\$953 300 followed by Singapore (290 tonnes, US\$1.3 million), the USA (240 tonnes, US\$611 300), Chile (220 tonnes, US\$469 600), and Uruguay (135 tonnes, US\$250 600). Until a few years ago Japan was the main exporter of sharks to Germany but since 1990, when imports from this source reached 1 200 tonnes, imports from Japan have dropped to bottom at 24 tonnes in 1998. In 1998 imports from South Africa were only of other sharks, as were those from Singapore, Chile, Uruguay and Japan. The great bulk of the imports from the USA consisted of frozen picked dogfish. In 1998 picked dogfish constituted much of the imports of fresh sharks, mainly from Norway and Denmark.

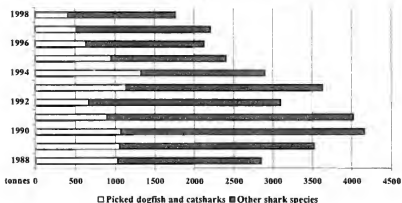
Figure 86 German shark imports by country of origin in tonnes



Source: EUROSTAT.

Most of the imported picked dogfish is destined for domestic consumption while other shark species, such as *Carcharhinidae*, are usually imported in frozen whole form and then processed and re-exported to other European countries. In Germany smoked picked dogfish backs and frozen sharks steaks of porbeagle and mako are particularly appreciated. Smooth-hound also has a good market. Other species marketed are nursehound, blue shark and angelshark. There is a preference for belly flaps, generally being used for smoking (*Schillerlocken*), but they are also sold fresh and frozen, skinned. Belly flaps are produced during the dressing of the fish and are individually skinned and washed prior to freezing. The preferred sizes are at least 30cm long and 1.25 cm wide¹³⁰.

Figure 87 German shark imports by species in tonnes



Source: EUROSTAT.

Picked dogfish (*Dornhai* in German) is the species usually used for the preparation of the two main products marketed in Germany: *Schillerlocken* and *Seeaal* (sea eel). *Schillerlocken* are smoked belly flaps, which are considered a gourmet speciality in Germany, a relatively expensive product. Their name is due to the fact that they curl during the smoking process, like the hair of the famed 18th century German poet and writer Friedrich Schiller. Picked dogfish are particularly appreciated and used for this preparation. Usually female specimens, which are larger than the males, are used as belly flaps are graded by length and longer ones are preferred. Twenty centimetres is the minimum length required for the German smoking market. North American picked dogfish are particularly appreciated as they are larger than European s but the quality of the latter is considered to be better because they are fatter and so are better for smoking. The word *Seeaal* indicate the backs (whole, skinless, headed and gutted, bellies removed), which are marketed fresh or smoked, with the latter obtaining higher prices. *Seeaal* is cheaper than *Schillerlocken*. Other shark species are marketed with names followed by the German vernacular name of the shark species. For example, the porbeagle, *Heringshai* in German, is traded as *kalbfish*; the smooth-hound, *Grauhai* in German, as *Speckfish*. The Greenland shark (*Somniosus microcephalus*), *Eishai* in German, appears also as *Speckfish*¹³¹.

¹³⁰ KREUZER R., AHMED R., *idem*.

¹³¹ LUDORFF W., *idem*.

Table 59 German prices for shark meat

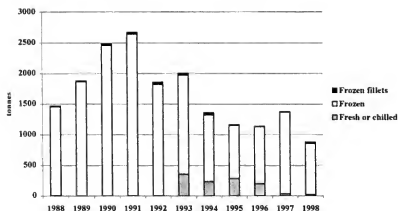
| Date | Origin | Species | Grade | Product form | Price US\$/kg |
|--------------|----------|----------------|-------------|------------------------------|---------------|
| March 1998 | Peru | Blue shark | 10-30 kg/pc | Frozen headed & gutted (H&G) | 1.20 c&f |
| | Chile | Mako shark | | | 2.60 c&f |
| October 1998 | Morocco | Blue shark | 10-40 kg/pc | H&G | 1.60 c&f |
| | USA | Picked dogfish | <6 kg/pc | Frozen belly flaps | 1.87 cif |
| | | | 6-10 kg/pc | | 2.53 cif |
| >10 kg/pc | 3.09 cif | | | | |
| July 1999 | Canada | | Small | Flaps | 2.65 cif |
| | | | Medium | | 4.85 cif |
| | | | Large | | 5.51 cif |

Source: GLOBEFISH European Fish Price Report.

In March 1999 100 g of *Schillerlocken* (20 cm length, 2 cm diameter) cost between US\$2.70 (megastore) and US\$3.60 (small shop). Canned *Schillerlocken* 85 g in oil cost US\$2.70.

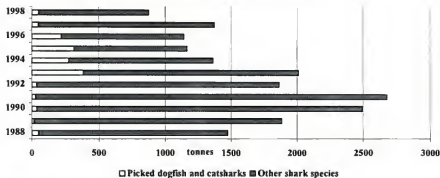
Germany re-exports part of its shark imports to other European countries. Exports of sharks were larger in the early 1980s, peaking at nearly 3 600 tonnes in 1982. In 1998 they were about 880 tonnes, worth US\$3.0 million. In 1998 there was a further decline in exports of picked dogfish and catsharks. In 1996 these species constituted 19.3% of total volume and 10.1% of the value but in 1998 their share was 6.1% in volume and 2.9% in value. In 1998 most German exports were frozen, mostly whole sharks (840 tonnes, worth US\$2.9 million) of which 19 tonnes were picked dogfish and 820 tonnes of other sharks. Exports of fresh sharks amounted to 24 tonnes, valued at US\$56 200, of which 91.7% were picked dogfish.

Figure 88 German shark exports by product forms in tonnes



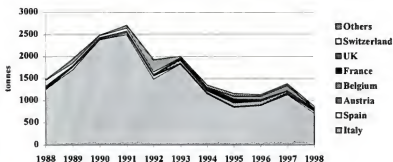
Source: EUROSTAT.

Figure 89 German shark exports by species in tonnes



Source: EUROSTAT.

Figure 90 German shark exports by country of destination in tonnes



Source: EUROSTAT.

In 1998 Germany exported sharks only inside the European continent, with Italy as the main destination followed by Spain, Austria, Belgium and France. In 1998 exports to Italy were 716 tonnes, worth US\$2.5 million, composed only of frozen other sharks.

Shark fins do not have a great market in Germany except for local Asian communities. Shark fin products are available in the Asian markets and restaurants of the major towns such as Hamburg, Berlin, and Frankfurt.

Products from shark cartilage as capsules and powder are sold in Germany, usually imported from the USA.

In Germany demand for liver oil was high in the past, particularly in the textile and leather business, for paints and varnishes and for cosmetics. Nowadays, shark oil is also used in pharmaceutical products such as ointments and capsules.

Until a few years ago, the shark leather market was quite important in Germany. It was used for furniture, book bindings, shoes and handbags. Shark skin was imported as raw material and tanned. Increasing restrictions on the German tanning industry have led to imports of tanned skins. Shark leather was imported as whole skins. Nowadays, imports and production of shark leather are fairly limited.

Table 60 German elasmobranch catches by species in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Various sharks nei | - | 100 | 100 | 100 | 200 | 200 | 300 | 300 | 400 | 300 |
| Raja rays nei | 200 | 100 | 100 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | - | - |
| Greenland shark | - | - | - | - | - | - | - | - | - | - |
| Large sharks nei | - | - | - | - | - | - | - | - | - | - |
| Picked dogfish | 700 | 1 200 | 1 100 | 700 | 900 | 700 | 900 | 700 | 1 200 | 1 000 |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Rays, stingrays, mantas nei | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, etc. nei | - | - | - | - | - | - | - | - | - | - |
| Total | 900 | 1 400 | 1 300 | 1 000 | 1 300 | 1 100 | 1 400 | 1 200 | 1 800 | 1 500 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Various sharks nei | 500 | 500 | 400 | 500 | 500 | 500 | 600 | 500 | 400 | 400 |
| Raja rays nei | 100 | 300 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Dogfish sharks nei | - | - | - | - | - | - | 200 | 100 | 100 | 400 |
| Greenland shark | - | - | - | 200 | 200 | 100 | 200 | - | - | - |
| Large sharks nei | - | 300 | 200 | 100 | 100 | 200 | 0 | 100 | - | - |
| Picked dogfish | 900 | 700 | 400 | 500 | 600 | 500 | 700 | 800 | 800 | 800 |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Rays, stingrays, mantas nei | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, etc. nei | - | - | - | - | - | - | - | - | - | - |
| Total | 1 500 | 1 800 | 1 200 | 1 500 | 1 600 | 1 500 | 1 900 | 1 700 | 1 500 | 1 800 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Various sharks nei | 300 | 300 | 200 | 400 | 148 | 176 | 171 | 27 | 57 | 60 |
| Raja rays nei | 100 | 100 | 200 | 400 | 100 | 157 | 85 | 133 | 256 | 108 |
| Dogfish sharks nei | 0 | 0 | 0 | 100 | 18 | 1 | 0 | 0 | 0 | 0 |
| Greenland shark | - | - | 0 | - | 6 | 0 | 0 | 2 | 0 | 0 |
| Large sharks nei | 0 | - | - | - | - | 41 | 11 | 51 | 40 | 154 |
| Picked dogfish | 800 | 1 200 | 1 300 | 1 000 | 416 | 280 | 321 | 129 | 417 | 71 |
| Porbeagle | - | - | - | - | 3 | 3 | 0 | 0 | 0 | 0 |
| Rays, stingrays, mantas nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 38 |
| Sharks, rays, skates, etc. nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Total | 1 200 | 1 600 | 1 700 | 1 900 | 691 | 658 | 588 | 342 | 778 | 433 |

Table 60 German elasmobranch catches by species in tonnes (continued)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|--------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Various sharks nei | 40 | 90 | 65 | 129 | 43 | 42 | 24 | 5 | 2 | 2 |
| Raja rays nei | 109 | 96 | 118 | 273 | 476 | 313 | 309 | 279 | 239 | 157 |
| Dogfish sharks nei | 0 | 0 | 6 | 43 | - | - | - | - | 0 | 0 |
| Greenland shark | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| Large sharks nei | 23 | 16 | 6 | 17 | 45 | 36 | 42 | 4 | - | 1 |
| Picked dogfish | 43 | 42 | 39 | 33 | 10 | 28 | 42 | 47 | 27 | 24 |
| Porbeagle | 0 | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rays, stingrays, mantas nei | 8 | 68 | 4 | 2 | 29 | 28 | 6 | 0 | 0 | 1 |
| Sharks, rays, skates, etc. nei | 0 | 0 | 4 | 3 | - | - | - | - | - | - |
| Total | 223 | 312 | 242 | 500 | 603 | 453 | 423 | 335 | 268 | 185 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Various sharks nei | 1 | 2 | 2 | 133 | 440 | 292 | 309 | 139 | | |
| Raja rays nei | 56 | 6 | 3 | 20 | 59 | 35 | 65 | 74 | | |
| Dogfish sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 12 | | |
| Greenland shark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Large sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Picked dogfish | 26 | 6 | 56 | 8 | 0 | 0 | 0 | 0 | | |
| Porbeagle | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | | |
| Rays, stingrays, mantas nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Sharks, rays, skates, etc. nei | - | - | - | - | - | - | - | - | | |
| Total | 83 | 14 | 61 | 161 | 521 | 327 | 393 | 225 | | |

Source: FAO - FIDI.

Table 61 German elasmobranch catches by fishing areas in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Atlantic, Northeast | 900 | 1 400 | 1 300 | 1 000 | 1 300 | 1 100 | 1 400 | 1 200 | 1 800 | 1 500 |
| Atlantic, Antarctic | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Eastern Central | - | - | - | - | - | - | - | - | - | - |
| Pacific, Northeast | - | - | - | - | - | - | - | - | - | - |
| Total | 900 | 1 400 | 1 300 | 1 000 | 1 300 | 1 100 | 1 400 | 1 200 | 1 800 | 1 500 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Atlantic, Northeast | 1 500 | 1 500 | 1 000 | 1 400 | 1 500 | 1 300 | 1 700 | 1 500 | 1 400 | 1 400 |
| Atlantic, Antarctic | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | - | 300 | 200 | 100 | 100 | 200 | 200 | 200 | 100 | 400 |
| Atlantic, Eastern Central | - | - | - | - | - | - | - | - | - | - |
| Pacific, Northeast | - | - | - | - | - | - | - | - | - | - |
| Total | 1 500 | 1 800 | 1 200 | 1 500 | 1 600 | 1 500 | 1 900 | 1 700 | 1 500 | 1 800 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Atlantic, Northeast | 1 200 | 900 | 1 000 | 1 100 | 573 | 554 | 565 | 274 | 684 | 236 |
| Atlantic, Antarctic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1 |
| Atlantic, Southeast | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 |
| Atlantic, Northwest | - | 700 | 700 | 800 | 118 | 103 | 23 | 68 | 86 | 157 |
| Atlantic, Eastern Central | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pacific, Northeast | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Total | 1 200 | 1 600 | 1 700 | 1 900 | 691 | 658 | 588 | 342 | 778 | 433 |

Table 61 German elasmobranch catches by fishing areas in tonnes (continued)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Atlantic, Northeast | 178 | 189 | 118 | 166 | 172 | 205 | 174 | 155 | 113 | 62 |
| Atlantic, Antarctic | 6 | 46 | 0 | 0 | 0 | 28 | 1 | 0 | 0 | 0 |
| Atlantic, Southeast | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Southwest | 2 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 1 |
| Atlantic, Northwest | 37 | 55 | 116 | 329 | 402 | 220 | 242 | 180 | 155 | 122 |
| Atlantic, Eastern Central | 0 | 22 | 8 | 5 | - | - | - | - | - | - |
| Pacific, Northeast | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Total | 223 | 312 | 242 | 500 | 603 | 453 | 423 | 335 | 268 | 185 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Atlantic, Northeast | 83 | 14 | 61 | 161 | 519 | 327 | 393 | 225 | | |
| Atlantic, Antarctic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Atlantic, Southeast | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Atlantic, Northwest | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | | |
| Atlantic, Eastern Central | - | - | - | - | - | - | - | - | | |
| Pacific, Northeast | - | - | - | - | - | - | - | - | | |
| Total | 83 | 14 | 61 | 161 | 521 | 327 | 393 | 225 | | |

Source: FAO - FIDL

Table 62 German imports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 340 | 257 | 277 | 260 | 167 | 643 | 510 | 450 | 266 | 127 | 122 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 276 | 255 | 165 | 592 | 459 | 431 | 265 | 120 | 92 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 1 | 5 | 2 | 51 | 51 | 19 | 1 | 7 | 30 |
| Other sharks | 49 | 69 | 63 | 77 | 72 | 48 | 37 | 44 | 51 | 42 | 38 |
| Total | 389 | 326 | 340 | 337 | 239 | 691 | 547 | 494 | 317 | 169 | 160 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 685 | 793 | 781 | 619 | 486 | 387 | 417 | 370 | 312 | 374 | 282 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 781 | 619 | 486 | 387 | 417 | 369 | 311 | 370 | 279 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | - | - | - | - | 1 | 1 | 4 | 3 |
| Other sharks | 1 738 | 2 390 | 3 011 | 3 032 | 2 288 | 2 432 | 1 520 | 1 396 | 1 410 | 1 629 | 1 291 |
| Total | 2 423 | 3 183 | 3 792 | 3 651 | 2 774 | 2 819 | 1 937 | 1 766 | 1 722 | 2 003 | 1 573 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 3 | 1 | 13 | 16 | 14 | 105 | 400 | 126 | 58 | 12 | 5 |
| Other sharks | 32 | 13 | 15 | 16 | 70 | 16 | 16 | 22 | 31 | 26 | 26 |
| Total | 35 | 14 | 28 | 32 | 84 | 121 | 416 | 148 | 89 | 38 | 31 |
| Grand total | 2 847 | 3 523 | 4 160 | 4 020 | 3 097 | 3 631 | 2 900 | 2 408 | 2 128 | 2 210 | 1 764 |

Source: EUROSTAT.

Table 63 German imports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 889 | 753 | 947 | 979 | 710 | 1 970 | 2 212 | 1 193 | 730 | 465 | 458 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 939 | 964 | 700 | 1 891 | 2 115 | 1 172 | 726 | 426 | 364 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 8 | 15 | 10 | 79 | 97 | 21 | 4 | 39 | 94 |
| Other sharks | 247 | 317 | 351 | 382 | 383 | 226 | 282 | 229 | 221 | 143 | 189 |
| Total | 1 136 | 1 070 | 1 298 | 1 361 | 1 093 | 2 196 | 2 494 | 1 422 | 951 | 608 | 646 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 761 | 1 997 | 2 381 | 1 503 | 964 | 749 | 1 298 | 636 | 550 | 681 | 728 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 2 381 | 1 503 | 964 | 749 | 1 298 | 632 | 547 | 674 | 713 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | - | - | - | - | 4 | 3 | 7 | 15 |
| Other sharks | 6 516 | 7 850 | 12 192 | 13 539 | 9 691 | 7 560 | 8 318 | 4 405 | 4 566 | 4 773 | 3 696 |
| Total | 8 277 | 9 847 | 14 573 | 15 042 | 10 655 | 8 309 | 9 616 | 5 041 | 5 116 | 5 454 | 4 425 |
| Frozen filets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 9 | 3 | 50 | 51 | 34 | 219 | 1 099 | 464 | 324 | 39 | 19 |
| Other sharks | 96 | 45 | 64 | 69 | 267 | 41 | 70 | 64 | 85 | 65 | 94 |
| Total | 105 | 48 | 114 | 120 | 301 | 260 | 1 169 | 528 | 409 | 104 | 112 |
| Grand total | 9 518 | 10 965 | 15 985 | 16 523 | 12 049 | 10 765 | 13 279 | 6 991 | 6 476 | 6 166 | 5 184 |

Source: EUROSTAT.

Table 64 German exports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 6 | - | - | - | 1 | 358 | 238 | 288 | 198 | 32 | 22 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | - | - | 1 | 358 | 238 | 268 | 198 | 32 | 22 |
| Catsharks | na | na | - | - | - | - | - | 20 | - | - | - |
| Other sharks | - | - | - | 1 | - | - | 1 | 2 | 2 | 4 | 2 |
| Total | 6 | - | - | 1 | 1 | 358 | 239 | 290 | 200 | 36 | 24 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 31 | 2 | 23 | 14 | 23 | 5 | 17 | 20 | 19 | 15 | 19 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | 23 | 14 | 23 | 5 | 17 | 20 | 19 | 11 | 19 |
| Catsharks | na | na | - | - | - | - | - | - | - | 4 | - |
| Other sharks | 1 419 | 1 866 | 2 438 | 2 627 | 1 798 | 1 613 | 1 068 | 840 | 914 | 1 316 | 817 |
| Total | 1 450 | 1 868 | 2 461 | 2 641 | 1 821 | 1 618 | 1 085 | 860 | 933 | 1 331 | 836 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 14 | 15 | 14 | 14 | 13 | 21 | 20 | 6 | 3 | 2 | 10 |
| Other sharks | 2 | 1 | 15 | 19 | 28 | 13 | 18 | 9 | 4 | 4 | 5 |
| Total | 16 | 16 | 29 | 33 | 41 | 34 | 38 | 15 | 7 | 6 | 15 |
| Grand total | 1 472 | 1 884 | 2 490 | 2 675 | 1 863 | 2 010 | 1 362 | 1 165 | 1 140 | 1 373 | 875 |

Source: EUROSTAT.

Table 65 German exports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 12 | 1 | | 2 | 3 | 1 123 | 1 097 | 559 | 301 | 41 | 47 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | - | 2 | 3 | 1 122 | 1 097 | 542 | 300 | 41 | 47 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | - | - | 1 | - | 17 | 1 | - | - |
| Other sharks | 5 | | 1 | 2 | | 1 | 9 | 8 | 6 | 15 | 9 |
| Total | 17 | 1 | 1 | 4 | 3 | 1 124 | 1 106 | 567 | 307 | 56 | 56 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 84 | 4 | 45 | 31 | 65 | 13 | 66 | 54 | 42 | 30 | 45 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 45 | 31 | 65 | 13 | 66 | 54 | 42 | 23 | 45 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | - | - | - | - | - | - | 7 | - |
| Other sharks | 7 669 | 8 441 | 14 314 | 16 085 | 9 995 | 6 575 | 6 758 | 2 947 | 3 235 | 4 002 | 2 813 |
| Total | 7 753 | 8 445 | 14 359 | 16 116 | 10 060 | 6 588 | 6 824 | 3 001 | 3 277 | 4 032 | 2 858 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 69 | 65 | 75 | 72 | 60 | 79 | 169 | 55 | 23 | 12 | 33 |
| Other sharks | 5 | 7 | 97 | 119 | 88 | 66 | 148 | 58 | 29 | 22 | 36 |
| Total | 74 | 72 | 172 | 191 | 148 | 145 | 317 | 113 | 52 | 34 | 69 |
| Grand total | 7 844 | 8 518 | 14 532 | 16 311 | 10 211 | 7 857 | 8 247 | 3 681 | 3 636 | 4 122 | 2 983 |

Source: EUROSTAT.

Table 66 German imports of sharks by country of origin in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| South Africa | 336 | 372 | 388 | 129 | 85 | 100 | 31 | 281 | 478 | 410 | 302 |
| Singapore | 17 | 32 | 354 | 240 | 72 | 89 | 118 | 182 | 237 | 195 | 293 |
| USA | 126 | 194 | 262 | 445 | 392 | 370 | 297 | 318 | 285 | 362 | 242 |
| Chile | 102 | 151 | 94 | 158 | 156 | 167 | 10 | - | - | - | 220 |
| Uruguay | 141 | 145 | 186 | 88 | 68 | 97 | 76 | 112 | 69 | 188 | 135 |
| Denmark | 344 | 361 | 315 | 313 | 234 | 177 | 159 | 126 | 99 | 79 | 94 |
| Taiwan PC | 149 | 60 | 91 | 464 | 269 | 179 | 45 | 34 | 7 | 12 | 63 |
| Norway | 42 | 39 | 120 | 31 | 36 | 508 | 413 | 369 | 213 | 65 | 46 |
| Canada | 66 | 108 | 184 | 22 | 224 | 239 | 572 | 315 | 147 | 191 | 33 |
| Mauritius | 23 | 24 | 41 | 33 | 11 | 50 | 38 | 12 | 122 | 132 | 31 |
| Japan | 675 | 1 139 | 1 206 | 931 | 606 | 784 | 405 | 150 | 208 | 239 | 24 |
| Trinidad & Tobago | 68 | - | 87 | 80 | 53 | 30 | - | 24 | 23 | 38 | 22 |
| UK | 413 | 450 | 198 | 80 | 82 | 52 | 95 | 75 | 76 | 55 | 20 |
| Ecuador | - | - | 1 | 238 | 102 | 12 | 4 | 13 | 2 | - | 0 |
| Peru | - | 20 | 66 | 133 | 33 | 20 | 10 | 36 | - | - | - |
| Faeroe Is. | 125 | 302 | 393 | 416 | 491 | 515 | 8 | - | - | - | - |
| China | - | - | - | - | - | - | 288 | - | - | - | - |
| Others | 220 | 126 | 174 | 219 | 183 | 242 | 331 | 361 | 162 | 244 | 239 |
| Total | 2 847 | 3 523 | 4 160 | 4 020 | 3 097 | 3 631 | 2 900 | 2 408 | 2 128 | 2 210 | 1 764 |

Source: EUROSTAT.

Table 67 German imports of sharks by country of origin in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|
| Singapore | 56 | 126 | 855 | 732 | 422 | 240 | 633 | 688 | 835 | 693 | 1 260 |
| South Africa | 1 106 | 950 | 1 150 | 515 | 353 | 218 | 150 | 802 | 1 385 | 1 069 | 953 |
| USA | 305 | 483 | 661 | 923 | 753 | 733 | 959 | 545 | 498 | 654 | 611 |
| Chile | 222 | 320 | 227 | 518 | 436 | 399 | 32 | - | - | - | 470 |
| Denmark | 982 | 1 024 | 1 151 | 1 250 | 1 005 | 770 | 1 258 | 777 | 710 | 411 | 432 |
| Uruguay | 437 | 328 | 513 | 384 | 214 | 244 | 269 | 277 | 171 | 462 | 251 |
| Taiwan PC | 441 | 179 | 261 | 1 524 | 787 | 355 | 169 | 120 | 17 | 33 | 157 |
| Mauritius | 71 | 67 | 117 | 173 | 66 | 140 | 174 | 37 | 395 | 338 | 111 |
| Japan | 3 094 | 4 499 | 5 858 | 6 000 | 3 577 | 3 450 | 3 108 | 668 | 904 | 1 040 | 103 |
| Norway | 113 | 104 | 326 | 73 | 73 | 1 369 | 1 450 | 697 | 357 | 110 | 94 |
| Canada | 143 | 246 | 560 | 92 | 714 | 620 | 2 648 | 977 | 404 | 595 | 87 |
| UK | 1 148 | 1 208 | 803 | 305 | 262 | 127 | 459 | 328 | 349 | 137 | 69 |
| Trinidad & Tobago | 190 | - | 304 | 338 | 223 | 96 | - | 60 | 65 | 56 | 59 |
| Ecuador | - | - | - | 273 | 136 | 36 | 42 | 41 | 18 | 1 | 1 |
| Peru | - | 34 | 141 | 297 | 78 | 38 | 42 | 63 | - | - | - |
| China | - | - | - | - | - | - | 402 | - | - | - | - |
| Faeroe Is. | 603 | 961 | 2 349 | 2 324 | 2 181 | 1 283 | 34 | - | - | - | - |
| Others | 607 | 436 | 709 | 802 | 769 | 647 | 1 450 | 911 | 368 | 567 | 526 |
| Total | 9 518 | 10 965 | 15 985 | 16 523 | 12 049 | 10 765 | 13 279 | 6 991 | 6 476 | 6 166 | 5 184 |

Source: EUROSTAT.

Table 68 German exports of sharks by country of destination in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|
| Italy | 1 252 | 1 701 | 2 383 | 2 501 | 1 489 | 1 832 | 1 155 | 851 | 892 | 1 137 | 716 |
| Spain | - | 63 | - | 41 | 70 | - | - | - | - | 16 | 44 |
| Austria | 38 | 25 | 29 | 38 | 24 | 20 | 22 | 15 | 13 | 26 | 23 |
| Belgium | 4 | - | - | 0 | - | 70 | 47 | 81 | 84 | 35 | 19 |
| France | 22 | 0 | 21 | - | 11 | 46 | 76 | 90 | 37 | 10 | 18 |
| UK | 13 | 4 | - | 2 | 4 | - | - | 62 | 76 | 124 | 3 |
| Switzerland | 132 | 59 | 48 | 65 | 54 | 8 | 4 | 5 | 3 | 4 | 3 |
| Netherlands | 2 | 8 | 3 | 10 | 178 | 3 | 2 | 6 | 6 | 2 | 2 |
| Others | 9 | 24 | 6 | 18 | 33 | 31 | 56 | 55 | 29 | 19 | 47 |
| Total | 1 472 | 1 884 | 2 490 | 2 675 | 1 863 | 2 010 | 1 362 | 1 165 | 1 140 | 1 373 | 875 |

Source: EUROSTAT.

Table 69 German exports of sharks by country of destination in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|--------------|--------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Italy | 6 754 | 7 872 | 14 008 | 15 473 | 8 632 | 7 459 | 7 334 | 3 008 | 3 135 | 3 493 | 2 499 |
| Spain | - | 163 | - | 157 | 357 | - | - | - | - | 25 | 63 |
| UK | 65 | 15 | - | 2 | 14 | - | - | 77 | 112 | 287 | 11 |
| Austria | 193 | 112 | 146 | 197 | 138 | 95 | 178 | 90 | 65 | 110 | 107 |
| Belgium | 9 | 1 | - | 1 | - | 81 | 114 | 106 | 133 | 68 | 62 |
| Switzerland | 748 | 283 | 290 | 398 | 349 | 46 | 27 | 29 | 15 | 24 | 20 |
| France | 33 | 1 | 41 | - | 29 | 53 | 220 | 119 | 44 | 12 | 41 |
| Netherlands | 6 | 14 | 14 | 25 | 519 | 8 | 13 | 17 | 13 | 3 | 5 |
| Others | 36 | 57 | 33 | 58 | 173 | 115 | 361 | 235 | 119 | 100 | 112 |
| Total | 7 844 | 8 518 | 14 532 | 16 311 | 10 211 | 7 857 | 8 247 | 3 681 | 3 636 | 4 122 | 2 983 |

Source: EUROSTAT.

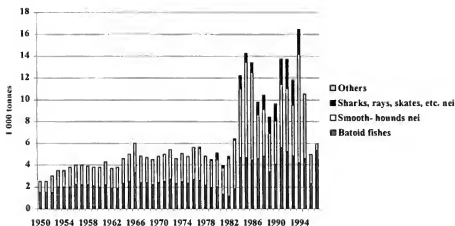
7.5 ITALY

7.5.1 Catches

Elasmobranchii represent only a small proportion of total Italian fisheries. Nearly 5 950 tonnes of *Elasmobranchii* were caught in 1997 by Italy, which is equivalent to 0.75% of world chondrichthyan catches and 1.06% of the Italian catch. Notwithstanding this, Italy is, according to FAO statistics, the world's largest shark importer. These species have always had a limited importance in Italian fisheries. Between 1950 and 1982 elasmobranch catches averaged 4 000 tonnes per year. Only in 1983 were they more than 6 000 tonnes and they exceeded 12 000 tonnes in 1984. The record was registered in 1994 with 16 500 tonnes. In the following two years they have declined considerably, falling to 5 000 tonnes in 1996, but in 1997 a 19.7% increase was experienced as compared to the previous year.

According to FAO statistics, sharks represented more than 10.4% of total Italian elasmobranch catches in 1997, the rest were batoid fishes. In 1997 the only shark species recorded was smooth-hounds nei (*Mustelus* spp.) but in previous years other species were caught: catsharks (*Scyliorhinus*), blackmouth catshark (*Galeus melastomus*) and dogfish (*Squalus* spp.).

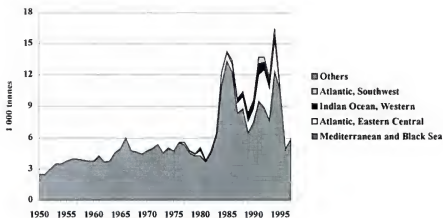
Figure 91 Italian elasmobranch catches by species in 1 000 tonnes (1950-1997)



Source: FAO - FIDI.

Italy is the major fishing country of *Elasmobranchii* in the Mediterranean, followed by Turkey, Greece and Tunisia. In 1997 nearly all of its catches were from this area. In previous years Italy also caught *Elasmobranchii* in other fishing areas; in 1994, 60.9% came from the Mediterranean, 29.3% from the Central Eastern Atlantic, 5.9% from the Western Indian Ocean and 3.9% from the Southwest Atlantic. Within the Mediterranean, a great part of the Italian elasmobranch catch comes from the Ionian Sea (84.4% in 1994).

Figure 92 Italian elasmobranch catches by fishing areas in 1 000 tonnes (1950-1997)



Source: FAO - FIDI.

In the Mediterranean sharks are captured by trawlers or as bycatch of longliners and driftnets. They are often taken as bycatch in the seasonal swordfish (April-May) and albacore (September-November) drift longline fisheries, mainly in the Gulf of Taranto and in the northern Adriatic Sea. Major shark species caught as bycatch are blue, thresher sharks and porbeagles. Blue sharks are probably recorded as *Mustelus* spp. in official statistics and also sold as *Mustelus*¹³². The size of blue sharks is reported to be decreasing and the average weight has been found to be 3.4 kg¹³³. This species is reported to be the most important share of all the bycatch of longliners. Research carried out in the southern Adriatic¹³⁴ reported that landings of blue sharks account for 74.4% by weight and 61.2% of units of the total bycatch. According to Spagnolo¹³⁵, in addition to blue and thresher sharks, other species caught are smooth-hound (*Mustelus mustelus*), starry smooth-hound (*Mustelus asterias*), nursehounds (*Scyliorhinus stellaris*), small-spotted catsharks (*Scyliorhinus canicula*), blackmouth catshark (*Galeus melastomus*) and velvet-belly (*Etmopterus spinax*). According to Fergusson¹³⁶, commercial catches of bluntnose sixgill shark (*Hexanchus griseus*), broadnose sevengill shark (*Notorynchus cepedianus*), gulper shark (*Centrophorus granulosus*) and shortfin mako exist in southern Italy and off Sicily.

¹³² BONFIL R., idem, citing DE METRIO G. et al. "Survey on summer-autumn population of *Prionace glauca* L. (Pisces, Chondrichthyes) in the Gulf of Taranto (Italy) during the four year period 1978-1981 and its incidence on swordfish (*Xiphias gladius*) and albacore (*Thunnus alalunga*) fishing", Oebulia, 1984.

¹³³ SPAGNOLO M., Appendix IV.6 "Sharks in the Mediterranean" of this volume.

¹³⁴ SPAGNOLO M., idem, citing MARANO et al, 1988.

¹³⁵ SPAGNOLO M., idem.

¹³⁶ OLIVER A., idem, citing FERGUSSON J. pers. comm. 1996.

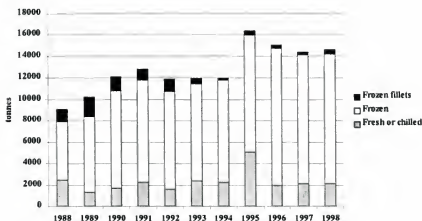
7.5.2 Markets and trade

According to FAO data, Italian production of *Elasmobranchii* has long been of minor importance. It was more significant in the early 1990s when it exceeded 4 000 tonnes annually. It peaked at nearly 4 900 tonnes in 1993 and fell away in since 1995 due to the decline in Italian elasmobranch catches. In 1997 no production of *Elasmobranchii* was reported, while in 1996 only 250 tonnes were produced and consisted exclusively of frozen sharks. In previous years Italy had also produced frozen skates to a maximum of nearly 2 200 tonnes in 1992.

Italy is, by far, the leading world importer of sharks followed by France and Spain, according to FAO statistics. Italian imports of *Elasmobranchii* consist only of fresh or frozen sharks in whole or fillet forms. Imports have substantially increased, especially since the late 1980s, from 8 750 tonnes in 1976. Italy imported 14 640 tonnes of shark worth US\$41.2 million in 1998, of which 16% were dogfish and catsharks and 84% were other sharks such as porbeagle and smooth-hounds (EUROSTAT data).

Currently the bulk of Italian shark imports is frozen, 12 050 tonnes (US\$25.6 million) whole and 450 tonnes (US\$1.8 million) filleted in 1998. The rest were fresh chilled, over 2 150 tonnes (US\$13.8 million) in that year. Italy has increased its imports of frozen sharks remarkably in the last few years.

Figure 93 Italian shark imports by product forms in tonnes

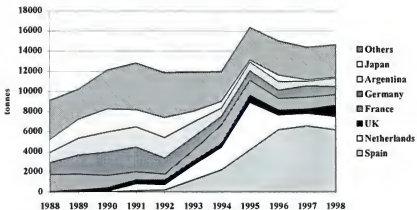


Source: EUROSTAT.

In 1998 Spain was the major supplier to Italy with 6 200 tonnes, valued US\$9.2 million, followed by Netherlands (1 290 tonnes, US\$6.4 million), UK (1 190 tonnes, US\$3.4 million), South Africa (1 040 tonnes, US\$3.2 million) and France (1 030 tonnes, US\$6.5 million). More than 73.3% of the volume and 70.1% of the value of Italian shark imports came from these five countries and over 75.0% came from Europe. Other major providers were Germany (835 tonnes, US\$3.1 million), Argentina (790 tonnes, US\$1.9 million), Singapore (735 tonnes, US\$1.8

million), Denmark (270 tonnes, US\$2.2 million) and the USA (230 tonnes, US\$1.1 million). Imports from Germany and Netherlands consist mainly of re-exports of sharks imported from outside the EU, particularly from Japan and South Africa as far as the Netherlands is concerned. Imports from Spain have increased impressively since 1993, going from 6 tonnes in 1988 to 1 200 tonnes in 1993 and 6 600 tonnes in 1997. In 1998 these imports have declined to 6 200 tonnes. The great bulk of Spanish exports to Italy consisted of frozen other sharks (5 900 tonnes in 1998) plus 200 tonnes of frozen dogfish and catsharks, 40 tonnes of frozen fillets and 40 tonnes of fresh sharks. Imports from France and Denmark were mainly fresh. Importers of shark meat to Italy have changed considerably in the course of the last 20 years. In 1975 Japan was the major supplier by far, followed by Republic of Korea, Uruguay, Denmark, Norway, Mauritania and China¹³⁷.

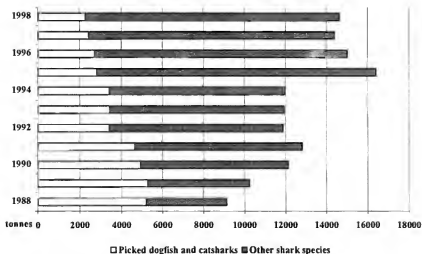
Figure 94 Italian shark imports by country of origin in tonnes



Source: EUROSTAT.

Sharks are mainly imported in dressed carcass form, processed in the country and sold as frozen steaks or fillets. Major species imported are porbeagle (*Lamna cornubica*), smooth-hounds, small spotted catshark (*Scyliorhinus canicula*), picked dogfish and mako shark (*Carcharhinus falciformis*), which is considered one of the preferred species and sold as *smoriglio*. Until a few years ago Italy imported tope sharks from France but they were found to have a high mercury content so these imports declined. Examination of EUROSTAT data shows no correspondence between the reported Italian shark imports from France and the French shark exports to Italy. The latter show a substantial decline in French exports to Italy from 1 000 tonnes in 1990 to 490 tonnes in 1991, while Italy reported imports of 900 tonnes from France in that year. Italian national statistics reported by ISTAT consider shark imports in two groups: "picked dogfish and smooth-hounds" and "other sharks" recorded as fresh and chilled and frozen. In 1996 frozen picked dogfish and smooth-hound represented 78.2% of the volume and 64.9% in value of Italian shark imports.

Figure 95 Italian shark imports by species in tonnes

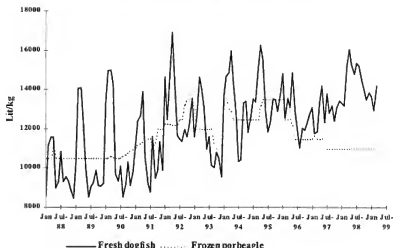


Source: EUROSTAT.

Sharks are more widely eaten in northern Italy. In general smaller shark species are preferred to larger. Italy represents the major European market for smooth-hounds (*Mustelus* spp.), especially *M. mustelus*, but *M. canis* is also imported. Smooth-hounds are generally sold as *palombo* but the name changes from one region to another so they are also known as *can bianco* (white dog) in Friuli Venezia Giulia, *cagneto* in Veneto, *missola* or *pallouna* in Liguria, *nizza* or *stera* in Marche, *cagnolo* or *penna* in Puglia. In Venice, *palombo* steaks are marketed as *vitello di mare* (veal of the sea). Sharks are usually marketed as *palombo* (smooth-hounds), *smeriglio* (mako shark but often also porbeagle) *gattucci* (catsharks), *spinaroli* and *cani spellati* (picked dogfish). There are also reports that blue sharks are marketed as the more valuable smooth-hounds under the name *palombo*, and porbeagle and mako shark as the more expensive *pesce spada* (swordfish) whose wholesale prices in March 1999 ranged between Lit 15 000 and Lit 23 000/kg (US\$9.10-13.90/kg).

In March 1999 average wholesale prices ranged between Lit 6 000 and Lit 9 300/kg (US\$3.50-5.60/kg) for fresh whole smooth-hounds and between Lit 10 800 and Lit 13 900/kg (US\$6.50-8.30/kg) for fresh, whole, skinless smooth-hounds. In the same period fresh, whole catshark (*gattuccio*) was quoted at between Lit 4 000 and Lit 8 500/kg (US\$2.40-5.15/kg) and *spinarolo* between Lit 10 500 and Lit 12 000/kg (US\$6.30-7.30/kg). Figure 96 shows two price series for fresh skinned dogfish and frozen porbeagle, both of foreign origin, at the wholesale market of Milan from January 1988 to March 1999.

Figure 96 Milan wholesale prices in Lit/kg



Source: *Listino dei prezzi all'ingrosso di Milano.*

Table 70 shows prices for catshark, dogfish and smooth-hounds in different Italian fish markets on 2nd February 1999. It can be noted that prices are higher in the markets of North of Italy as compared to those in the South.

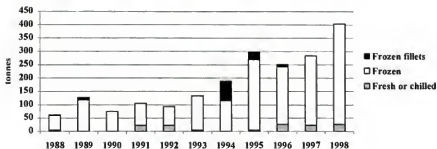
Table 70 Wholesale prices in different Italian markets on February 1999

| Species | Product form | Market | Origin | Lit/kg | US\$/kg |
|---------------|-------------------------|-------------------|----------|--------------|-----------|
| Catshark | Fresh, chilled | Cagliari | | 4 000 | 2.34 |
| Catshark | Fresh, chilled | Livorno | Domestic | 8 890-12 960 | 5.20-7.57 |
| Dogfish | Whole | Venezia | Domestic | 4 000-8 000 | 2.34-4.68 |
| Dogfish | Whole | Venezia | Foreign | 3 000-13 000 | 1.75-7.60 |
| Smooth-hounds | | Civitanova Marche | Domestic | 9 282 | 5.42 |
| Smooth-hounds | Frozen, skinned | Molfetta | Foreign | 4 500-5 000 | 2.63-2.92 |
| Smooth-hounds | Fresh, chilled | Palermo | | 4 000-5 000 | 2.34-2.92 |
| Smooth-hounds | Fresh, chilled | Porto Palo | | 4 000-5 000 | 2.34-2.92 |
| Smooth-hounds | Fresh, chilled, skinned | Roma | Foreign | 1 000-13 000 | 5.84-7.60 |
| Smooth-hounds | Fresh, chilled | Siracusa | | 4 000-5 000 | 2.34-2.92 |
| Smooth-hounds | Whole | Venezia | Foreign | 8 000-12 500 | 4.68-7.31 |

Source: ISMEA

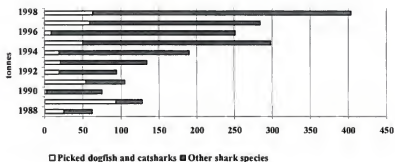
Historically, Italian exports of sharks have been marginal. In 1976 they amounted to 175 tonnes worth US\$154 000 and until 1997 they have never exceeded 390 tonnes. According to EUROSTAT figures, in 1998 Italy exported more than 400 tonnes worth US\$809 300. Major countries of destination were Greece, Tunisia, France and Spain. Exports were mainly frozen.

Figure 97 Italian shark exports by product forms in tonnes



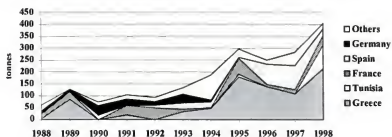
Source: EUROSTAT.

Figure 98 Italian shark exports by species in tonnes



Source: EUROSTAT.

Figure 99 Italian shark exports by country of destination in tonnes



Source: EUROSTAT.

Small quantities of shark fin preparations, such as canned soup, dried processed shark fin and dried whole fin, are imported from Singapore, Hong Kong, China and France for the use of Asian markets and restaurants, mainly in Rome and Milan. They are not reported in FAO statistics.

The market for shark cartilage products is limited. There are reports of imports of such products from the USA and UK.

No statistics are available on shark hides and liver oil. Neither of these products seem to have a big market in Italy. According to Kreuzer and Ahmed¹³⁸, Italian leather manufacturers are not familiar with shark hide and there is no demand as such for shark liver oil. He suggested that there could be imports of prepared shark oils for industrial applications.

¹³⁸KREUZER R., AHMED R., *idem*.

Table 71 Italian elasmobranch catches by species in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|--------------|
| Rays, stingrays, mantas nei | 1 500 | 1 500 | 1 500 | 2 000 | 2 000 | 2 000 | 2 200 | 2 200 | 2 200 | 2 100 |
| Smooth- hounds nei | 1 000 | 1 000 | 1 500 | 1 500 | 1 500 | 1 800 | 1 800 | 1 800 | 1 700 | 1 700 |
| Sharks, rays, skates, etc. nei | - | - | - | - | - | - | - | - | - | - |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | - | - |
| Large sharks nei | - | - | - | - | - | - | - | - | - | - |
| Raja rays nei | - | - | - | - | - | - | - | - | - | - |
| Total | 2 500 | 2 500 | 3 000 | 3 500 | 3 500 | 3 800 | 4 000 | 4 000 | 3 900 | 3 800 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Rays, stingrays, mantas nei | 2 000 | 2 200 | 1 900 | 1 900 | 2 300 | 2 500 | 3 300 | 2 400 | 2 400 | 2 200 |
| Smooth- hounds nei | 1 800 | 2 100 | 1 800 | 1 900 | 2 300 | 2 500 | 2 700 | 2 400 | 2 300 | 2 300 |
| Sharks, rays, skates, etc. nei | - | - | - | - | - | - | - | - | - | - |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | - | - |
| Large sharks nei | - | - | - | - | - | - | - | - | - | - |
| Raja rays nei | - | - | - | - | - | - | - | - | - | - |
| Total | 3 800 | 4 300 | 3 700 | 3 800 | 4 600 | 5 000 | 6 000 | 4 800 | 4 700 | 4 500 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Rays, stingrays, mantas nei | 2 400 | 2 500 | 2 700 | 2 300 | 2 470 | 2 351 | 2 673 | 2 575 | 2 133 | 1 949 |
| Smooth- hounds nei | 2 400 | 2 500 | 2 700 | 2 300 | 2 591 | 2 420 | 2 935 | 2 950 | 2 632 | 2 459 |
| Sharks, rays, skates, etc. nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 90 | 30 | 127 |
| Dogfish sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 |
| Large sharks nei | - | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| Raja rays nei | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 0 |
| Total | 4 800 | 5 000 | 5 400 | 4 600 | 5 061 | 4 771 | 5 608 | 5 631 | 4 826 | 4 535 |
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Rays, stingrays, mantas nei | 2 004 | 1 344 | 1 151 | 1 822 | 4 706 | 4 679 | 4 460 | 4 579 | 4 807 | 3 369 |
| Smooth- hounds nei | 2 531 | 2 399 | 3 462 | 4 459 | 6 323 | 8 777 | 8 027 | 4 039 | 4 319 | 3 529 |
| Sharks, rays, skates, etc. nei | 589 | 168 | 194 | 162 | 1 187 | 817 | 912 | 1 158 | 1 300 | 1 500 |
| Dogfish sharks nei | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Large sharks nei | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Raja rays nei | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Total | 5 124 | 3 911 | 4 807 | 6 443 | 12 216 | 14 273 | 13 399 | 9 776 | 10 426 | 8 398 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Rays, stingrays, mantas nei | 4 078 | 5 582 | 5 244 | 4 840 | 4 187 | 4 586 | 2 309 | 5 325 | | |
| Smooth- hounds nei | 3 983 | 5 825 | 5 778 | 4 675 | 9 999 | 5 942 | 2 659 | 621 | | |
| Sharks, rays, skates, etc. nei | 1 552 | 2 339 | 2 698 | 2 287 | 2 287 | 0 | 0 | 0 | | |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | | |
| Large sharks nei | - | - | - | - | - | - | - | - | | |
| Raja rays nei | - | - | - | - | - | - | - | - | | |
| Total | 9 613 | 13 746 | 13 720 | 11 802 | 16 473 | 10 528 | 4 968 | 5 946 | | |

Source: FAO - FIDI.

Table 72 Italian elasmobranch catches by fishing area in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Mediterranean and Black Sea | 2 500 | 2 500 | 3 000 | 3 500 | 3 500 | 3 800 | 4 000 | 4 000 | 3 900 | 3 800 |
| Atlantic, Eastern Central | - | - | - | - | - | - | - | - | - | - |
| Indian Ocean, Western | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | - | - |
| Total | 2 500 | 2 500 | 3 000 | 3 500 | 3 500 | 3 800 | 4 000 | 4 000 | 3 900 | 3 800 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Mediterranean and Black Sea | 3 800 | 4 300 | 3 700 | 3 800 | 4 600 | 5 000 | 6 000 | 4 800 | 4 700 | 4 500 |
| Atlantic, Eastern Central | - | - | - | - | - | - | - | - | - | - |
| Indian Ocean, Western | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | - | - |
| Total | 3 800 | 4 300 | 3 700 | 3 800 | 4 600 | 5 000 | 6 000 | 4 800 | 4 700 | 4 500 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Mediterranean and Black Sea | 4 800 | 5 000 | 5 400 | 4 600 | 5 061 | 4 771 | 5 608 | 5 349 | 4 576 | 4 306 |
| Atlantic, Eastern Central | - | 0 | 0 | 0 | 0 | 0 | 0 | 246 | 174 | 155 |
| Indian Ocean, Western | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Southeast | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 45 | 74 |
| Atlantic, Northeast | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| Atlantic, Northwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 29 | 0 |
| Total | 4 800 | 5 000 | 5 400 | 4 600 | 5 061 | 4 771 | 5 608 | 5 631 | 4 826 | 4 535 |

Table 72 Italian elasmobranch catches by fishing area in tonnes (continued)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|-----------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|--------------|
| Mediterranean and Black Sea | 4 324 | 3 730 | 4 609 | 6 281 | 11 029 | 13 344 | 12 297 | 8 366 | 8 786 | 6 523 |
| Atlantic, Eastern Central | 503 | 13 | 198 | 162 | 1 187 | 839 | 743 | 987 | 1 175 | 1 100 |
| Indian Ocean, Western | 270 | 168 | 0 | 0 | 0 | 0 | 0 | 141 | 263 | 260 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 142 | 0 | 260 |
| Atlantic, Southeast | 27 | 0 | 0 | 0 | 0 | 90 | 359 | 140 | 202 | 255 |
| Atlantic, Northeast | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Atlantic, Northwest | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Total | 5 124 | 3 911 | 4 807 | 6 443 | 12 216 | 14 273 | 13 399 | 9 776 | 10 426 | 8 398 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Mediterranean and Black Sea | 7 522 | 9 514 | 8 864 | 7 686 | 12 357 | 10 494 | 4 960 | 5 946 | | |
| Atlantic, Eastern Central | 1 255 | 2 539 | 3 641 | 3 087 | 3 087 | 26 | 6 | 0 | | |
| Indian Ocean, Western | 523 | 1 058 | 729 | 617 | 617 | 5 | 1 | 0 | | |
| Atlantic, Southwest | 313 | 635 | 486 | 412 | 412 | 3 | 1 | 0 | | |
| Atlantic, Southeast | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Atlantic, Northeast | - | - | - | - | - | - | - | - | | |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | | |
| Total | 9 613 | 13 746 | 13 720 | 11 802 | 16 473 | 10 528 | 4 968 | 5 946 | | |

Source: FAO - FIDI.

Table 73 Italian imports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 2 295 | 1 277 | 1 611 | 2 022 | 1 403 | 1 831 | 1 705 | 1 464 | 1 549 | 1 748 | 1 641 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | 1 611 | 2 022 | 1 403 | 1 801 | 1 676 | 1 450 | 1 536 | 1 696 | 1 568 |
| Catsharks | na | na | - | - | - | 30 | 29 | 14 | 13 | 52 | 73 |
| Other sharks | 188 | 63 | 124 | 206 | 213 | 581 | 551 | 3 588 | 446 | 372 | 507 |
| Total | 2 483 | 1 340 | 1 735 | 2 228 | 1 616 | 2 412 | 2 256 | 5 052 | 1 995 | 2 120 | 2 148 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 2 850 | 3 913 | 3 231 | 2 478 | 1 951 | 1 504 | 1 669 | 1 313 | 1 156 | 673 | 618 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | 2 980 | 2 179 | 1 683 | 1 272 | 1 372 | 886 | 841 | 603 | 573 |
| Catsharks | na | na | 251 | 299 | 268 | 232 | 297 | 427 | 315 | 70 | 45 |
| Other sharks | 2 581 | 3 111 | 5 801 | 7 090 | 7 157 | 7 508 | 7 853 | 9 627 | 11 614 | 11 339 | 11 430 |
| Total | 5 431 | 7 024 | 9 032 | 9 568 | 9 108 | 9 012 | 9 522 | 10 940 | 12 770 | 12 012 | 12 048 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 59 | 102 | 80 | 146 | 40 | 96 | 48 | 42 | 5 | 8 | 17 |
| Other sharks | 1 155 | 1 791 | 1 295 | 896 | 1 123 | 423 | 169 | 378 | 268 | 258 | 430 |
| Total | 1 214 | 1 893 | 1 375 | 1 042 | 1 163 | 519 | 217 | 420 | 273 | 266 | 447 |
| Grand total | 9 128 | 10 257 | 12 142 | 12 838 | 11 887 | 11 943 | 11 995 | 16 412 | 15 038 | 14 398 | 14 643 |

Source: EUROSTAT.

Table 74 Italian imports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 13 062 | 7 391 | 11 148 | 12 360 | 8 808 | 9 783 | 15 781 | 8 760 | 9 421 | 9 636 | 11 018 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 11 148 | 12 360 | 8 808 | 9 595 | 15 501 | 8 659 | 9 307 | 9 348 | 66 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | - | - | 188 | 280 | 101 | 114 | 288 | 475 |
| Other sharks | 956 | 482 | 679 | 1 240 | 1 402 | 3 201 | 4 674 | 2 976 | 2 680 | 2 160 | 2 778 |
| Total | 14 018 | 7 873 | 11 827 | 13 600 | 10 210 | 12 984 | 20 455 | 11 736 | 12 101 | 11 796 | 13 796 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 5 484 | 8 305 | 7 944 | 6 564 | 5 041 | 3 350 | 6 169 | 3 130 | 2 279 | 1 155 | 1 168 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 7 390 | 5 759 | 4 365 | 2 835 | 5 138 | 2 055 | 1 686 | 1 009 | 1 080 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 554 | 805 | 676 | 515 | 1 031 | 1 075 | 593 | 146 | 88 |
| Other sharks | 11 084 | 12 028 | 25 023 | 34 704 | 30 369 | 22 470 | 39 758 | 26 458 | 27 117 | 26 097 | 24 392 |
| Total | 16 568 | 20 333 | 32 967 | 41 268 | 35 410 | 25 820 | 45 927 | 29 588 | 29 396 | 27 252 | 25 560 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 97 | 164 | 137 | 322 | 166 | 321 | 237 | 152 | 18 | 18 | 46 |
| Other sharks | 4 850 | 7 469 | 6 505 | 5 864 | 6 445 | 1 789 | 1 188 | 1 388 | 1 011 | 839 | 1 754 |
| Total | 4 947 | 7 633 | 6 642 | 6 186 | 6 611 | 2 110 | 1 425 | 1 540 | 1 029 | 857 | 1 800 |
| Grand total | 35 533 | 35 839 | 51 436 | 61 054 | 52 231 | 40 914 | 67 807 | 42 864 | 42 526 | 39 905 | 41 155 |

Source: EUROSTAT.

Table 75 Italian exports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|------------|------------|------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 | - | - | 10 | 13 | 1 | 1 | 2 | 2 | 11 | 15 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | - | - | 1 | 1 | - | - | 2 | 11 | 13 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | 10 | 12 | - | - | 2 | - | - | 2 |
| Other sharks | 4 | - | - | 13 | 11 | 4 | - | 3 | 25 | 13 | 12 |
| Total | 5 | - | - | 23 | 24 | 5 | - | 5 | 27 | 24 | 27 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 23 | 83 | 3 | 44 | 6 | 20 | 17 | 48 | 6 | 48 | 48 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | 3 | 44 | 6 | 20 | 17 | 48 | 6 | 48 | 27 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | - | - | - | - | - | - | - | - | 21 |
| Other sharks | 33 | 35 | 72 | 38 | 63 | 109 | 99 | 216 | 210 | 212 | 329 |
| Total | 56 | 118 | 75 | 82 | 69 | 129 | 116 | 264 | 216 | 260 | 377 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 | 10 | - | - | - | - | 1 | - | 1 | - | - |
| Other sharks | - | - | - | - | 1 | - | 72 | 29 | 7 | - | - |
| Total | 1 | 10 | - | - | 1 | - | 73 | 29 | 8 | - | - |
| Grand total | 62 | 128 | 75 | 105 | 94 | 134 | 189 | 298 | 251 | 284 | 404 |

Source: EUROSTAT.

Table 77 Italian imports of sharks by country of origin in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Spain | 6 | 59 | 50 | 142 | 211 | 1 203 | 2 217 | 4 196 | 6 206 | 6 595 | 6 198 |
| Netherlands | 43 | 43 | 31 | 667 | 506 | 1 456 | 2 216 | 4 712 | 1 446 | 1 219 | 1 288 |
| UK | 3 | 119 | 370 | 419 | 497 | 431 | 407 | 755 | 515 | 472 | 1 186 |
| South Africa | 265 | 330 | 667 | 1 022 | 669 | 666 | 272 | 385 | 569 | 601 | 1 042 |
| France | 1 703 | 1 563 | 1 210 | 803 | 572 | 1 079 | 1 848 | 1 489 | 1 175 | 1 183 | 1 032 |
| Germany | 1 167 | 1 922 | 2 315 | 2 461 | 1 608 | 1 282 | 859 | 917 | 811 | 1 123 | 835 |
| Argentina | 1 009 | 1 655 | 1 999 | 2 006 | 2 026 | 1 502 | 815 | 859 | 858 | 438 | 793 |
| Singapore | 275 | - | 179 | 203 | 305 | 335 | 329 | 734 | 570 | 788 | 753 |
| Denmark | 1 201 | 437 | 335 | 851 | 553 | 1 120 | 802 | 735 | 576 | 359 | 272 |
| USA | - | - | 147 | 395 | 74 | 160 | 231 | 262 | 149 | 262 | 234 |
| Portugal | 7 | - | 388 | 385 | 572 | 615 | 523 | 504 | 520 | 615 | 146 |
| Japan | 1 286 | 1 902 | 2 312 | 1 722 | 2 000 | 1 079 | 671 | 232 | 638 | 154 | 138 |
| Mauritania | 635 | 579 | 709 | 260 | 63 | 184 | 156 | 247 | 206 | 72 | 109 |
| Ecuador | 132 | 40 | - | - | 207 | 182 | 199 | 81 | 601 | 171 | 36 |
| Morocco | 311 | 188 | 188 | 88 | 80 | 97 | 53 | 27 | 17 | 31 | 31 |
| Senegal | 142 | 557 | 434 | 110 | 132 | 83 | 66 | 27 | 18 | 50 | 29 |
| Turkey | 95 | 10 | 48 | 60 | 111 | 17 | 38 | 122 | 13 | 12 | 10 |
| Oman | 5 | 9 | 21 | 125 | 219 | 120 | 69 | - | - | - | 1 |
| Brazil | 348 | 447 | 289 | 332 | 247 | 19 | 19 | - | - | - | - |
| Norway | 44 | 112 | 227 | 461 | 316 | 1 | - | - | - | - | - |
| Faeroe Is. | 82 | - | - | - | 464 | - | - | - | - | - | - |
| Others | 369 | 285 | 223 | 326 | 455 | 312 | 205 | 76 | 150 | 253 | 510 |
| Total | 9 128 | 10 257 | 12 142 | 12 838 | 11 887 | 11 943 | 11 995 | 16 360 | 15 038 | 14 398 | 14 643 |

Source: EUROSTAT.

Table 78 Italian imports of sharks by country of origin in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Spain | 33 | 185 | 195 | 523 | 461 | 1 953 | 7 971 | 7 011 | 9 241 | 10 399 | 9 209 |
| Netherlands | 187 | 172 | 81 | 3 293 | 2 914 | 4 761 | 13 067 | 7 021 | 7 183 | 6 481 | 6 439 |
| France | 9 747 | 8 242 | 8 353 | 5 734 | 4 142 | 5 479 | 12 897 | 6 663 | 6 317 | 6 187 | 6 530 |
| Germany | 6 388 | 9 347 | 13 717 | 15 486 | 9 499 | 5 355 | 5 778 | 3 805 | 3 352 | 4 026 | 3 065 |
| Denmark | 6 327 | 2 065 | 2 051 | 5 496 | 3 663 | 5 837 | 7 416 | 4 473 | 3 983 | 2 468 | 2 185 |
| Singapore | 806 | - | 456 | 700 | 1 310 | 1 088 | 1 888 | 2 706 | 1 691 | 2 012 | 1 812 |
| South Africa | 881 | 831 | 1 888 | 3 729 | 2 286 | 2 164 | 1 139 | 1 121 | 1 623 | 1 850 | 3 216 |
| UK | 11 | 591 | 2 353 | 2 365 | 3 109 | 2 203 | 3 798 | 3 949 | 2 644 | 1 844 | 3 449 |
| Argentina | 1 745 | 3 090 | 5 135 | 5 860 | 5 424 | 3 911 | 3 506 | 2 254 | 1 715 | 938 | 1 880 |
| Portugal | 41 | - | 1 146 | 1 173 | 1 473 | 1 376 | 1 901 | 763 | 1 063 | 930 | 285 |
| USA | - | - | 297 | 845 | 160 | 289 | 686 | 470 | 329 | 831 | 1 122 |
| Japan | 4 793 | 6 360 | 9 783 | 10 149 | 10 532 | 4 260 | 4 755 | 988 | 1 416 | 428 | 244 |
| Ecuador | 161 | 45 | - | - | 365 | 377 | 589 | 153 | 970 | 251 | 105 |
| Mauritania | 1 195 | 1 320 | 1 609 | 631 | 165 | 414 | 644 | 642 | 441 | 129 | 190 |
| Senegal | 296 | 948 | 1 101 | 300 | 483 | 233 | 307 | 81 | 55 | 100 | 94 |
| Morocco | 785 | 414 | 456 | 233 | 231 | 254 | 199 | 65 | 39 | 57 | 62 |
| Turkey | 178 | 21 | 157 | 232 | 415 | 43 | 171 | 319 | 33 | 46 | 35 |
| Oman | 8 | 14 | 38 | 292 | 520 | 239 | 201 | - | - | - | 1 |
| Brazil | 514 | 781 | 770 | 828 | 408 | 38 | 63 | - | - | - | - |
| Norway | 199 | 464 | 1 076 | 1 925 | 1 455 | 2 | - | - | - | - | - |
| Faeroe Is. | 256 | - | - | - | 1 573 | - | - | - | - | - | - |
| Others | 982 | 949 | 774 | 1 260 | 1 643 | 638 | 831 | 380 | 431 | 928 | 1 232 |
| Total | 35 533 | 35 839 | 51 436 | 61 054 | 52 231 | 40 914 | 67 807 | 42 864 | 42 526 | 39 905 | 41 155 |

Source: EUROSTAT.

Table 79 Italian exports of sharks by country of destination in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|------------|------------|------------|
| Greece | 4 | 86 | - | 20 | - | 34 | 48 | 180 | 138 | 109 | 215 |
| Tunisia | - | - | - | - | - | - | - | 6 | - | - | 99 |
| France | 21 | 32 | - | 39 | 50 | 10 | 3 | 68 | 10 | 17 | 39 |
| Spain | 1 | - | 18 | - | 10 | 26 | 24 | 4 | 86 | 102 | 28 |
| Malta | 3 | - | - | 11 | - | - | - | 13 | 3 | - | - |
| UK | - | - | - | - | - | - | 93 | 24 | 1 | 1 | - |
| Germany | 10 | 10 | 42 | 29 | 17 | 38 | 9 | 0 | - | - | 1 |
| Others | 23 | 0 | 15 | 6 | 17 | 26 | 12 | 3 | 13 | 55 | 22 |
| Total | 62 | 128 | 75 | 105 | 94 | 134 | 189 | 298 | 251 | 284 | 404 |

Source: EUROSTAT.

Table 80 Italian exports of sharks by country of destination in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Greece | 11 | 160 | - | 56 | - | 77 | 135 | 417 | 309 | 223 | 456 |
| Tunisia | - | - | - | - | - | - | - | - | 14 | - | 129 |
| France | 44 | 60 | - | 209 | 312 | 29 | 15 | 187 | 29 | 90 | 118 |
| Spain | 1 | - | 33 | - | 35 | 66 | 114 | 8 | 212 | 255 | 53 |
| Germany | 59 | 39 | 148 | 45 | 51 | 108 | 25 | 1 | - | - | 4 |
| UK | - | - | - | - | - | - | 385 | 44 | 5 | 3 | - |
| Malta | 21 | - | - | 33 | - | - | - | 27 | 13 | - | - |
| Others | 22 | 0 | 52 | 40 | 88 | 78 | 46 | 28 | 56 | 215 | 49 |
| Total | 158 | 259 | 233 | 383 | 486 | 358 | 720 | 712 | 638 | 786 | 809 |

Source: EUROSTAT.

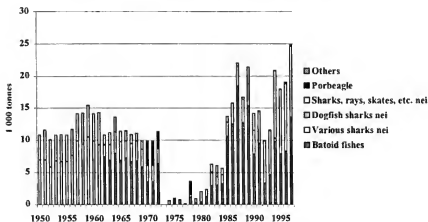
7.6 SPAIN

7.6.1 Catches

During the period 1950-97, Spanish elasmobranch catches increased from 10 800 tonnes to 24 900 tonnes. This growth was not regular. During 1950-1972 catches varied between 10 000 tonnes and 15 000 tonnes per year with larger catches in 1957-61. In 1973 they collapsed and catches recovered slowly in the following years until the mid-1980s when they climbed from 5 700 tonnes to 13 700 tonnes in one year, 1984/5. Between 1985 and 1997 catches fluctuated with a maximum of 24 900 tonnes in 1997 and a minimum of 10 000 tonnes in 1992.

In 1997 the Spanish elasmobranch catch was composed of 54.7% batoid fishes, (53.6% identified raja rays nei), and 44.2% various sharks nei. The rest consisted of 211 tonnes of dogfish nei and 50 tonnes of "elasmobranch not identified". According to Bonfil¹³⁹, unspecified sharks are composed of shortfin makos, porbeagles, small-spotted catshark (*Scyliorhinus canicula*) and some squaloids. Fleming and Papageorgiou¹⁴⁰ claim that the main species captured are blue sharks, shortfin mako sharks, tope sharks, small spotted catshark, kitefin sharks, birdbeak dogfish (*Deania calcea*), Portuguese dogfish (*Centroscyllium coelelepis*), knifetooth dogfish (*Scymnodon ringens*), gulper sharks, thresher sharks, sandbar sharks, pickled dogfish and blackmouth catsharks (*Galeus melastomus*).

Figure 100 Spanish elasmobranch catches by species in 1 000 tonnes (1950-1997)



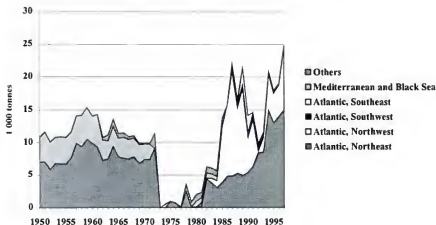
Source: FAO - FIDI.

¹³⁹ BONFIL R., *idem*.

¹⁴⁰ FLEMING E.H., PAPAGEORGIOU P.A., *idem*.

Northeast Atlantic is traditionally the main fishing area where Spanish vessels capture *Elasmobranchii* and in 1997 60.0% of the catch came from this area, 38.3% from the Northwest Atlantic and small amounts from the Southwest, Southeast and Antarctic Atlantic. In the mid/late 1980s there was a considerable increase in Spanish elasmobranch catches in the Northwest Atlantic, which became the main fishing area for these species for a few years. In the past a large quantity of *Elasmobranchii* was taken in the Mediterranean but since 1988 no catches have been reported from this area. Various sharks are captured in the Northeast Atlantic.

Figure 101 Spanish elasmobranch catches by fishing areas in 1 000 tonnes (1950-1997)



Source: FAO-FIDI

Elasmobranchii have almost always been captured as a bycatch, especially of swordfish fisheries, shortfin makos being the most important species caught, but they have also often been targeted on a seasonal basis. According to Oliver¹⁴¹, Spain has two fisheries directed at sharks. An offshore fishery that targets some deep-water species and another that occurs on the continental slope off Cantabria. The first began in 1991 with the appearance of a market for the liver oil of the targeted species. The main sharks captured are little sleeper shark (*Somniosus rostratus*), birdbeak shark, gulper shark (*Centrophorus granulosus*), and Portuguese dogfish. Livers represent the principal commercial product of this fishery and are occasionally the only retained parts. In 1993 landings of deep-water sharks (skinned and gutted) amounted to 234 tonnes. The other fishery is more restricted and occurs when traditional target species are lacking. Major species captured by this fishery are small spotted and blackmouth catsharks and gulper sharks.

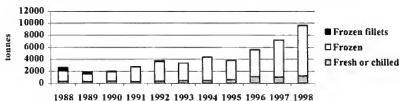
¹⁴¹ OLIVER A., *idem*.

7.6.2 Markets and trade

The Spanish market for *Elasmobranchii* is in a very dynamic phase of expansion with increasing production, imports and exports in the last few years. According to FAO statistics, Spain was the largest exporter and fourth largest importer of *Elasmobranchii* in the world by volume in 1997. Spanish production of *Elasmobranchii* started in 1992 with nearly 1 000 tonnes and by 1997 Spain was the second largest producer of *Elasmobranchii* in the world with 12 100 tonnes. In 1997 its production consisted only of frozen sharks but frozen skates were also reported in 1992 and 1993.

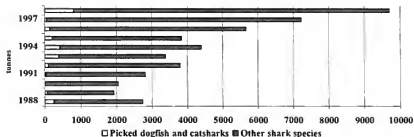
Spain has substantially increased its imports of fresh and frozen sharks in the last few years from 850 tonnes (US\$1 million) in 1981 to 7 200 tonnes (US\$11.4 million) in 1997, according to FAO statistics. This increase was not regular, with imports falling below those of the previous year five times in this period. According to EUROSTAT data, in 1998 imports were 9 700 tonnes, worth US\$14.7 million. The great bulk of these imports, 8 400 tonnes (US\$11.9 million), were in frozen whole form, which has shown the largest increase in the last few years. Of these, 540 tonnes (US\$1.1 million) were picked dogfish and 7 840 tonnes (US\$10.8 million) other sharks. Imports of fresh sharks amounted to 1 240 tonnes (US\$2.7 million) of which 270 tonnes (US\$344 300) were dogfish and catsharks. Since 1988 there has been a substantial decrease in imports of frozen fillets. In 1988 they came to 674 tonnes (US\$1.5 million), by 1998 they were only 69 tonnes (US\$104 230).

Figure 102 Spanish shark imports by product forms in tonnes



Source: EUROSTAT.

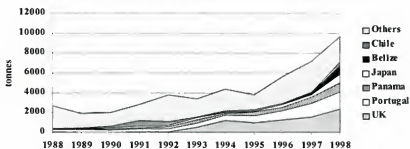
Figure 103 Spanish shark imports by species in tonnes



Source: EUROSTAT.

In 1998 UK was the major supplier of shark to Spain, with 2 360 tonnes, worth US\$4.7 million, followed by Portugal (1 740 tonnes, US\$3.1 million), Panama (915 tonnes, US\$733 150), Japan (884 tonnes, US\$760 100), Belize (870 tonnes, US\$722 600), Chile (372 tonnes, US\$860 800), Honduras (354 tonnes, US\$429 800) and China (302 tonnes, US\$209 600). Most Spanish imports of fresh shark came from UK, Portugal, UK, Morocco and France.

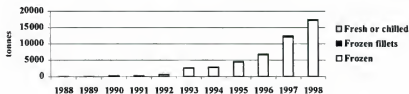
Figure 104 Spanish shark imports by country of origin in tonnes



Source: EUROSTAT.

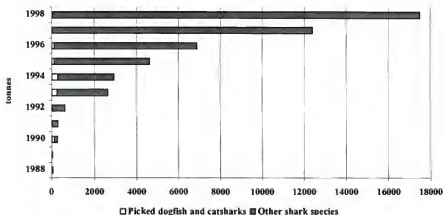
Spanish exports of sharks have grown from 1 tonne worth US\$5 000 in 1981 to nearly 12 400 tonnes, worth US\$27.4 million in 1997, making Spain the largest exporter in the world by volume, according to FAO statistics. According to EUROSTAT data, in 1998 exports were nearly 17 500 tonnes, worth US\$34.1 million. Frozen sharks provided 99.5% of these exports, 17 200 tonnes worth US\$33.4 million whole shark and 200 tonnes (US\$427 500) fillets. Sharks other than catsharks and dogfish made up 99.9% of the exports in 1998. Spain nearly doubled its exports in one year, from 6 900 tonnes in 1996 to 12 400 tonnes in 1997. In 1998 a further increase of 40.9% was experienced. Moreover, Spanish exports have reached a wider range of markets. In 1996 these exports went to a restricted number of countries, mostly inside the EU, with Italy being the major destination, receiving 71.6%. In 1998 nearly 7 000 tonnes (US\$10.1 million) were exported to Italy, 40.0% of total exports. Other significant recipient countries were Seychelles (3 550 tonnes, US\$3.8 million), Hong Kong (1 290 tonnes, US\$9.7 million), Uruguay (1 010 tonnes, US\$1.2 million), Madagascar (960 tonnes, US\$961 500) and Mauritius (946 tonnes, US\$895 900).

Figure 105 Spanish shark exports by product forms in tonnes



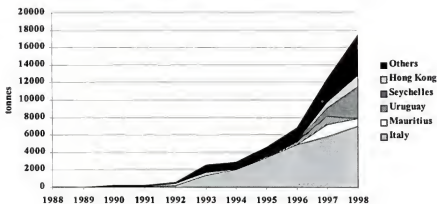
Source: EUROSTAT.

Figure 106 Spanish shark exports by species in tonnes



Source: EUROSTAT.

Figure 107 Spanish shark exports by country of destination in tonnes



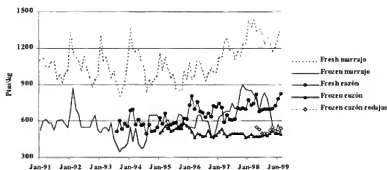
Source: EUROSTAT.

Shark meat is usually marketed skinned and gutted as steaks and fillets. It is consumed all over the country but is particularly appreciated on the Mediterranean coast of Spain. Shortfin mako shark (*marrajo*) is the preferred species, followed by thresher shark, tope shark (*cazón*), smooth hammerhead, smooth-hound, picked dogfish and bigeye thresher shark. Other less valuable species are small-spotted catshark, kitefin shark, gulper sharks and blue sharks.

Even if the terms *marrajo* and *cazón* indicate, respectively, shortfin mako shark and tope shark, they are also often used when selling other shark species. Shortfin mako shark obtains

higher prices than other species, similar to those of swordfish. Sometimes makos are marketed as swordfish. In February 1999 the wholesale prices for mako shark were US\$9.22/kg for fresh and US\$3.45/kg for frozen; while those for tope shark were US\$5.61/kg (fresh), US\$3.37/kg (frozen) and US\$3.66 (frozen steaks). The following figure shows five price series for fresh and frozen marrajo and fresh and frozen cazon (whole and steaks), at the wholesale market of Barcelona from January 1991 to February 1999.

Figure 108 Barcelona wholesale prices in Ptas/kg



Source: Mercabarna.

Fins are usually taken from the shark species captured, in particular from shortfin mako, thresher, blue and hammerhead sharks. They are usually exported to Asian countries such as Republic of Korea, Thailand, and China. Exports of shark fins to China have increased substantially in the last few years, going from 424 tonnes, valued US\$1.6 million in 1996 to 1 040 tonnes, worth US\$ 3.9 million in 1998. There are also recorded imports of dried fins from Hong Kong, China, Singapore and other East Asian countries. Dried fins are marketed in Asian shops and used in Chinese restaurants, mainly in Madrid and Barcelona. The General Service of Statistics and Planning records this trade but it is not reported to FAO.

Spain imports and exports shark skin and leather according to the statistics recorded by the General Service of Statistics and Planning. These products do not seem to have a great market in Spain; they are probably imported processed or semi-processed and then re-exported¹⁴².

The Ministry of Health has authorized cartilage, liver oil and squalene for consumption and use in pharmaceutical and cosmetic products. There is an expanding market for shark cartilage products such as capsules and powder. They are usually imported. Liver oil of several species is exported increasingly, in particular that of little sleeper shark, birdbeak shark, gulper shark and Portuguese dogfish. There is an emerging market for shark spine cartilage, which is also exported.

¹⁴² FLEMING E.H., PAPAGEORGIOU P.A, *idem*.

Table 81 Spanish elasmobranch catches by species in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Raja rays nei | - | - | - | - | - | - | - | - | - | - |
| Various sharks nei | 7 000 | 7 000 | 5 900 | 6 800 | 6 700 | 6 700 | 7 700 | 9 900 | 9 400 | 10 500 |
| Rays, stingrays, mantas nei | - | - | - | - | - | - | - | - | - | - |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, etc. nei | 3 800 | 4 600 | 4 200 | 4 000 | 4 200 | 4 100 | 4 000 | 4 200 | 4 800 | 4 900 |
| Picked dogfish | - | - | - | - | - | - | - | - | - | - |
| Large sharks nei | - | - | - | - | - | - | - | - | - | - |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Total | 10 800 | 11 600 | 10 100 | 10 800 | 10 900 | 10 800 | 11 700 | 14 100 | 14 200 | 15 400 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Raja rays nei | - | - | 5 500 | 5 100 | 6 100 | 4 900 | 5 000 | 4 700 | 4 700 | 4 100 |
| Various sharks nei | 9 900 | 9 300 | 1 800 | 2 400 | 3 300 | 2 900 | 2 600 | 2 800 | 3 100 | 2 700 |
| Rays, stingrays, mantas nei | - | - | 2 000 | 1 800 | 1 900 | 2 000 | 2 300 | 2 000 | 2 100 | 1 800 |
| Dogfish sharks nei | - | - | - | - | - | - | - | - | - | - |
| Sharks, rays, skates, etc. nei | 4 200 | 5 000 | 1 500 | 1 900 | 2 300 | 1 600 | 1 600 | 1 400 | 1 200 | 1 300 |
| Picked dogfish | - | - | - | - | - | - | - | - | - | - |
| Large sharks nei | - | - | - | - | - | - | - | - | - | - |
| Porbeagle | - | - | - | - | - | - | - | - | - | - |
| Total | 14 100 | 14 300 | 10 800 | 11 200 | 13 600 | 11 400 | 11 500 | 10 900 | 11 100 | 9 900 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Raja rays nei | 3 600 | 3 600 | 6 400 | 0 | 0 | 1 016 | 744 | 80 | 448 | 59 |
| Various sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rays, stingrays, mantas nei | - | - | 0 | 0 | 0 | 0 | 0 | 0 | 727 | 223 |
| Dogfish sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 28 |
| Sharks, rays, skates, etc. nei | 2 500 | 2 500 | 2 300 | 0 | 600 | 0 | 0 | 0 | 399 | 604 |
| Picked dogfish | - | 0 | 0 | 0 | 0 | 0 | 0 | 69 | 6 | 9 |
| Large sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Porbeagle | 3 800 | 3 800 | 2 700 | - | - | - | - | - | 2 087 | 0 |
| Total | 9 900 | 9 900 | 11 400 | 0 | 600 | 1 016 | 745 | 149 | 3 667 | 924 |

Table 81 Spanish elasmobranch catches by species in tonnes (continued)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|--------------------------------|---------------|---------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Raja rays nei | 28 | 612 | 2 407 | 2 500 | 2 770 | 10 059 | 12 514 | 17 685 | 11 617 | 14 659 |
| Various sharks nei | 0 | 8 | 2 068 | 1 349 | 1 416 | 2 215 | 3 257 | 3 169 | 3 648 | 3 440 |
| Rays, stingrays, mantas nei | 319 | 621 | 525 | 518 | 500 | 530 | 0 | 708 | 1 083 | 695 |
| Dogfish sharks nei | 78 | 37 | 66 | 653 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sharks, rays, skates, etc. nei | 1 622 | 1 114 | 1 237 | 1 096 | 1 018 | 914 | 0 | 460 | 334 | 2 619 |
| Picked dogfish | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Large sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Porbeagle | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Total | 2 052 | 2 392 | 6 303 | 6 116 | 5 704 | 13 718 | 15 771 | 22 022 | 16 682 | 21 413 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Raja rays nei | 7 113 | 8 449 | 2 093 | 3 785 | 9 310 | 7 511 | 8 078 | 13 329 | | |
| Various sharks nei | 3 640 | 4 992 | 6 551 | 6 862 | 10 998 | 10 000 | 10 500 | 11 000 | | |
| Rays, stingrays, mantas nei | 791 | 1 073 | 1 277 | 888 | 519 | 435 | 255 | 289 | | |
| Dogfish sharks nei | 0 | 0 | 0 | 52 | 55 | 0 | 138 | 211 | | |
| Sharks, rays, skates, etc. nei | 2 619 | 64 | 25 | 30 | 30 | 20 | 30 | 50 | | |
| Picked dogfish | 0 | 0 | 0 | 0 | 0 | 0 | 63 | 0 | | |
| Large sharks nei | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Porbeagle | - | - | - | - | - | - | - | - | | |
| Total | 14 163 | 14 578 | 9 946 | 11 617 | 20 912 | 17 966 | 19 064 | 24 879 | | |

Source: FAO - FIDL

Table 82 Spanish elasmobranch catches by fishing areas in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Atlantic, Northeast | 7 000 | 7 000 | 5 900 | 6 800 | 6 700 | 6 700 | 7 700 | 9 900 | 9 400 | 10 500 |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Antarctic | - | - | - | - | - | - | - | - | - | - |
| Mediterranean and Black Sea | 3 800 | 4 600 | 4 200 | 4 000 | 4 200 | 4 100 | 4 000 | 4 200 | 4 800 | 4 900 |
| Atlantic, Eastern Central | - | - | - | - | - | - | - | - | - | - |
| Total | 10 800 | 11 600 | 10 100 | 10 800 | 10 900 | 10 800 | 11 700 | 14 100 | 14 200 | 15 400 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Atlantic, Northeast | 9 900 | 9 300 | 7 300 | 7 500 | 9 400 | 7 800 | 7 600 | 7 500 | 7 800 | 6 800 |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Antarctic | - | - | - | - | - | - | - | - | - | - |
| Mediterranean and Black Sea | 4 200 | 5 000 | 3 100 | 2 800 | 3 100 | 2 900 | 3 200 | 3 000 | 2 900 | 2 900 |
| Atlantic, Eastern Central | - | - | 400 | 900 | 1 100 | 700 | 700 | 400 | 400 | 200 |
| Total | 14 100 | 14 300 | 10 800 | 11 200 | 13 600 | 11 400 | 11 500 | 10 900 | 11 100 | 9 900 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Atlantic, Northeast | 7 400 | 7 400 | 9 100 | 0 | 0 | 1 016 | 743 | 0 | 2 531 | 34 |
| Atlantic, Northwest | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 149 | 10 | 63 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Southeast | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Atlantic, Antarctic | - | - | - | - | - | - | - | - | - | - |
| Mediterranean and Black Sea | 2 400 | 2 400 | 0 | 0 | 600 | 0 | 0 | 0 | 0 | 0 |
| Atlantic, Eastern Central | 100 | 100 | 2 300 | 0 | 0 | 0 | 0 | 0 | 1 126 | 823 |
| Total | 9 900 | 9 900 | 11 400 | 0 | 600 | 1 016 | 745 | 149 | 3 667 | 924 |

Table 82 Spanish elasmobranch catches by fishing areas in tonnes (continued)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|-----------------------------|---------------|---------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Atlantic, Northeast | 0 | 347 | 4 437 | 3 842 | 3 107 | 3 872 | 4 830 | 4 888 | 5 297 | 4 941 |
| Atlantic, Northwest | 111 | 310 | 104 | 660 | 1 079 | 8 402 | 10 941 | 15 966 | 9 968 | 13 158 |
| Atlantic, Southwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 203 | 724 | 695 |
| Atlantic, Southeast | 47 | 144 | 5 | 28 | 0 | 0 | 0 | 0 | 0 | 2 619 |
| Atlantic, Antarctic | - | - | - | - | 0 | 0 | 0 | 0 | 0 | 0 |
| Mediterranean and Black Sea | 879 | 720 | 787 | 671 | 630 | 514 | 0 | 965 | 693 | 0 |
| Atlantic, Eastern Central | 1 015 | 871 | 970 | 915 | 888 | 930 | - | - | - | - |
| Total | 2 052 | 2 392 | 6 303 | 6 116 | 5 704 | 13 718 | 15 771 | 22 022 | 16 682 | 21 413 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Atlantic, Northeast | 5 431 | 6 346 | 8 435 | 8 573 | 14 878 | 13 000 | 14 000 | 15 000 | | |
| Atlantic, Northwest | 5 322 | 7 095 | 209 | 2 126 | 5 485 | 4 511 | 4 779 | 9 540 | | |
| Atlantic, Southwest | 791 | 1 070 | 1 223 | 838 | 469 | 395 | 225 | 247 | | |
| Atlantic, Southeast | 2 619 | 67 | 52 | 80 | 80 | 60 | 60 | 90 | | |
| Atlantic, Antarctic | 0 | - | 0 | 0 | 0 | 0 | 0 | 2 | | |
| Mediterranean and Black Sea | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Atlantic, Eastern Central | - | - | 27 | - | - | - | - | - | | |
| Total | 14 163 | 14 578 | 9 946 | 11 617 | 20 912 | 17 966 | 19 064 | 24 879 | | |

Source: FAO - FIDI.

Table 83 Spanish imports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 34 | 5 | - | 3 | - | 21 | 8 | 9 | 17 | 18 | 269 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | - | 1 | - | 21 | 8 | 2 | 8 | 3 | 258 |
| Catsharks | na | na | - | 2 | - | - | - | 7 | 9 | 15 | 11 |
| Other sharks | 301 | 316 | 390 | 329 | 388 | 463 | 472 | 621 | 1 088 | 1 020 | 970 |
| Total | 335 | 321 | 390 | 332 | 388 | 484 | 480 | 630 | 1 105 | 1 038 | 1 239 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 213 | 62 | - | 29 | 96 | 369 | 411 | 199 | 121 | 40 | 539 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | - | 20 | 96 | 169 | 172 | 50 | 71 | - | 539 |
| Catsharks | na | na | - | 9 | - | 200 | 239 | 149 | 50 | 40 | - |
| Other sharks | 1 504 | 1 149 | 1 531 | 2 373 | 3 119 | 2 514 | 3 457 | 2 951 | 4 369 | 6 112 | 7 844 |
| Total | 1 717 | 1 211 | 1 531 | 2 402 | 3 215 | 2 883 | 3 868 | 3 150 | 4 490 | 6 152 | 8 383 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | - | - | - | - | - | - | - | - | - | - | - |
| Other sharks | 674 | 388 | 117 | 70 | 188 | 12 | 38 | 53 | 67 | 28 | 69 |
| Total | 674 | 388 | 117 | 70 | 188 | 12 | 38 | 53 | 67 | 28 | 69 |
| Grand total | 2 726 | 1 920 | 2 038 | 2 804 | 3 791 | 3 379 | 4 386 | 3 833 | 5 662 | 7 218 | 9 691 |

Source: EUROSTAT.

Table 84 Spanish imports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|---------------|---------------|---------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 50 | 4 | 1 | 5 | - | 37 | 25 | 14 | 32 | 15 | 344 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | - | 1 | - | 36 | 25 | 9 | 28 | 5 | 337 |
| Catsharks | na | na | 1 | 4 | - | 1 | - | 5 | 4 | 10 | 7 |
| Other sharks | 437 | 491 | 1 083 | 738 | 733 | 983 | 1 876 | 1 591 | 2 435 | 1 833 | 2 365 |
| Total | 487 | 495 | 1 084 | 743 | 733 | 1 020 | 1 901 | 1 605 | 2 467 | 1 848 | 2 709 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 322 | 84 | - | 67 | 167 | 676 | 1 384 | 686 | 365 | 69 | 1 120 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | - | 55 | 167 | 379 | 656 | 126 | 131 | - | 1 120 |
| Catsharks | na | na | - | 12 | - | 297 | 728 | 560 | 234 | 69 | - |
| Other sharks | 2 882 | 2 035 | 3 297 | 5 385 | 6 927 | 4 233 | 11 498 | 5 996 | 7 629 | 9 397 | 10 759 |
| Total | 3 204 | 2 119 | 3 297 | 5 452 | 7 094 | 4 909 | 12 882 | 6 682 | 7 994 | 9 466 | 11 879 |
| Frozen filets: | | | | | | | | | | | |
| Picked dogfish and catsharks | - | - | - | - | - | - | - | - | - | - | - |
| Other sharks | 1 454 | 736 | 215 | 145 | 593 | 55 | 108 | 216 | 100 | 93 | 104 |
| Total | 1 454 | 736 | 215 | 145 | 593 | 55 | 108 | 216 | 100 | 93 | 104 |
| Grand total | 5 145 | 3 350 | 4 596 | 6 340 | 8 420 | 5 984 | 14 891 | 8 503 | 10 561 | 11 407 | 14 692 |

Source: EUROSTAT.

Table 85 Spanish exports of sharks by product form in tonnes

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|-----------|-----------|------------|------------|------------|--------------|--------------|--------------|--------------|---------------|---------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 | - | - | - | - | - | - | - | - | 1 | 4 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | - | - | - | - | - | - | - | - | - | 4 |
| <i>Catsharks</i> | <i>na</i> | - | - | - | - | - | - | - | - | 1 | - |
| Other sharks | 20 | 9 | - | - | 20 | 4 | 12 | 60 | 135 | 262 | 88 |
| Total | 21 | 9 | - | - | 20 | 4 | 12 | 60 | 135 | 263 | 92 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 1 | 10 | 22 | - | 21 | 250 | 276 | 111 | 122 | - | 13 |
| Of which: | | | | | | | | | | | |
| <i>Picked dogfish</i> | <i>na</i> | <i>na</i> | - | - | 21 | - | 54 | 1 | - | - | 13 |
| <i>Catsharks</i> | <i>na</i> | <i>na</i> | 22 | - | - | 250 | 222 | 110 | 122 | - | - |
| Other sharks | 21 | - | 128 | 198 | 536 | 2 372 | 2 551 | 4 326 | 6 526 | 12 083 | 17 161 |
| Total | 22 | 10 | 150 | 198 | 557 | 2 622 | 2 827 | 4 437 | 6 648 | 12 083 | 17 174 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | - | - | 98 | - | - | - | - | - | 2 | 7 | - |
| Other sharks | 3 | 7 | 19 | 90 | 36 | 5 | 89 | 117 | 89 | 37 | 196 |
| Total | 3 | 7 | 117 | 90 | 36 | 5 | 89 | 117 | 91 | 44 | 196 |
| Grand total | 46 | 26 | 267 | 288 | 613 | 2 631 | 2 928 | 4 614 | 6 874 | 12 390 | 17 462 |

Source: EUROSTAT.

Table 86 Spanish exports of sharks by product form in US\$ 1 000

| Products | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|------------|------------|------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|
| Fresh or chilled: | | | | | | | | | | | |
| Picked dogfish and catsharks | 18 | - | - | - | - | - | 2 | - | - | 1 | 12 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | - | - | - | - | - | 2 | - | - | - | 11 |
| Catsharks | na | - | - | - | - | - | - | - | - | 1 | 1 |
| Other sharks | 125 | 73 | - | - | 116 | 32 | 99 | 132 | 717 | 412 | 278 |
| Total | 143 | 73 | - | - | 116 | 32 | 101 | 132 | 717 | 413 | 290 |
| Frozen: | | | | | | | | | | | |
| Picked dogfish and catsharks | 4 | 23 | 29 | - | 34 | 307 | 752 | 421 | 575 | - | 21 |
| Of which: | | | | | | | | | | | |
| Picked dogfish | na | na | - | - | 34 | - | 265 | 3 | - | - | 21 |
| Catsharks | na | na | 29 | - | - | 307 | 487 | 419 | 575 | - | - |
| Other sharks | 102 | - | 178 | 1 235 | 3 923 | 8 670 | 12 023 | 11 903 | 15 777 | 26 919 | 33 357 |
| Total | 106 | 23 | 207 | 1 235 | 3 957 | 8 977 | 12 775 | 12 324 | 16 352 | 26 919 | 33 378 |
| Frozen fillets: | | | | | | | | | | | |
| Picked dogfish and catsharks | - | - | 242 | - | - | - | - | - | 6 | 14 | - |
| Other sharks | 5 | 15 | 190 | 502 | 209 | 20 | 1 131 | 456 | 470 | 79 | 427 |
| Total | 5 | 15 | 432 | 502 | 209 | 20 | 1 131 | 456 | 476 | 93 | 427 |
| Grand total | 254 | 111 | 639 | 1 737 | 4 282 | 9 029 | 14 007 | 12 912 | 17 545 | 27 425 | 34 095 |

Source: EUROSTAT.

Table 87 Spanish imports of sharks by country of origin in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| UK | 42 | - | 15 | 66 | 52 | 501 | 1 200 | 953 | 1 259 | 1 560 | 2 359 |
| Portugal | 273 | 291 | 211 | 275 | 310 | 414 | 556 | 704 | 955 | 1 365 | 1 742 |
| Panama | 16 | 62 | 99 | 143 | 239 | 338 | 162 | 434 | 332 | 648 | 915 |
| Japan | - | 49 | 118 | 150 | 94 | 244 | 84 | 31 | 253 | 236 | 884 |
| Belize | - | - | - | - | - | 11 | 91 | 39 | 54 | 268 | 869 |
| Chile | 99 | 78 | 216 | 591 | 430 | 33 | 111 | 169 | 61 | 21 | 372 |
| Honduras | 1 | 8 | 47 | 262 | 255 | 276 | 353 | 161 | 328 | 504 | 354 |
| China | 40 | 53 | 54 | 73 | 17 | 7 | 73 | - | 6 | 303 | 302 |
| Peru | 729 | 512 | 246 | 230 | 535 | 260 | 182 | 157 | 109 | 246 | 255 |
| Guinea | - | - | - | - | - | 1 | - | 37 | 202 | 84 | 155 |
| Sao Tome and Principe | - | - | - | - | - | - | - | - | 23 | 273 | 153 |
| Taiwan PC | 489 | 142 | 157 | 63 | 127 | 135 | 249 | 32 | 134 | 141 | 152 |
| Uruguay | - | - | 22 | 2 | 124 | 117 | 104 | 25 | 25 | 9 | 89 |
| Morocco | 102 | 202 | 227 | 134 | 183 | 168 | 89 | 74 | 134 | 212 | 71 |
| France | 6 | - | 2 | 1 | 3 | 8 | 27 | 51 | 86 | 84 | 56 |
| Ireland | - | - | - | - | - | 25 | 168 | 195 | 85 | 21 | 53 |
| Mauritania | 112 | 136 | 234 | 169 | 271 | 35 | 138 | 5 | 215 | 251 | 52 |
| Sierra Leone | 41 | 34 | 46 | 49 | 78 | 62 | 10 | - | 79 | 37 | 46 |
| Argentina | 6 | 37 | 24 | 5 | 2 | 121 | 117 | 21 | 11 | 28 | 25 |
| Guinea Bissau | - | - | - | - | 2 | 40 | 100 | - | 62 | 216 | 24 |
| Korea Rep. | 161 | 85 | 76 | 61 | 42 | 20 | 4 | - | 62 | 56 | 24 |
| Brazil | 15 | - | 39 | 23 | 173 | 128 | 12 | - | - | 14 | 12 |
| Ecuador | 123 | - | - | 26 | 67 | 10 | 7 | 23 | 30 | 18 | 4 |
| Cuba | 66 | 7 | - | - | - | - | - | 438 | 989 | 230 | - |
| USA | 43 | - | 31 | - | 194 | 11 | 67 | - | 4 | - | - |
| Others | 362 | 224 | 174 | 481 | 593 | 414 | 482 | 284 | 164 | 393 | 723 |
| Total | 2 726 | 1 920 | 2 038 | 2 804 | 3 791 | 3 379 | 4 386 | 3 833 | 5 662 | 7 218 | 9 691 |

Source: EUROSTAT.

Table 88 Spanish imports of sharks by country of origin in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|---------------|---------------|---------------|
| UK | 35 | - | 20 | 48 | 30 | 1 480 | 5 492 | 3 419 | 4 152 | 3 378 | 4 702 |
| Portugal | 258 | 219 | 244 | 422 | 759 | 802 | 1 457 | 1 325 | 1 321 | 1 676 | 3 127 |
| Chile | 369 | 325 | 831 | 1 811 | 1 232 | 76 | 313 | 378 | 126 | 32 | 861 |
| Japan | - | 102 | 232 | 321 | 191 | 164 | 188 | 33 | 284 | 277 | 760 |
| Panama | 47 | 77 | 223 | 193 | 260 | 309 | 244 | 421 | 378 | 652 | 733 |
| Belize | - | - | - | - | - | 22 | 157 | 41 | 85 | 519 | 723 |
| Peru | 1 539 | 1 037 | 505 | 703 | 1 341 | 447 | 622 | 344 | 273 | 557 | 720 |
| Honduras | 1 | 17 | 121 | 271 | 449 | 292 | 946 | 247 | 400 | 615 | 430 |
| China | 52 | 76 | 92 | 170 | 30 | 13 | 468 | - | 17 | 354 | 210 |
| Taiwan PC | 1 083 | 250 | 421 | 206 | 411 | 325 | 877 | 75 | 234 | 144 | 176 |
| Morocco | 142 | 237 | 353 | 291 | 501 | 313 | 256 | 139 | 245 | 417 | 166 |
| Ireland | - | - | - | - | - | 49 | 764 | 552 | 230 | 51 | 164 |
| Sao Tome and Principe | - | - | - | - | - | - | - | - | 24 | 327 | 151 |
| France | 11 | - | 6 | 2 | 10 | 36 | 169 | 204 | 255 | 196 | 141 |
| Guinea | - | - | - | 1 | - | 1 | - | 47 | 312 | 100 | 126 |
| Uruguay | - | - | 57 | 10 | 254 | 198 | 256 | 52 | 22 | 11 | 108 |
| Mauritania | 189 | 237 | 486 | 357 | 711 | 74 | 360 | 7 | 442 | 433 | 73 |
| Guinea Bissau | - | - | - | - | 4 | 66 | 246 | - | 77 | 392 | 46 |
| Sierra Leone | 69 | 64 | 118 | 247 | 183 | 94 | 27 | - | 110 | 49 | 45 |
| Argentina | 8 | 51 | 51 | 10 | 1 | 253 | 453 | 44 | 24 | 61 | 39 |
| Brazil | 22 | - | 45 | 72 | 350 | 247 | 49 | - | - | 59 | 27 |
| Korea Rep. | 382 | 207 | 261 | 197 | 80 | 30 | 15 | - | 65 | 68 | 22 |
| Ecuador | 180 | - | - | 59 | 153 | 22 | 25 | 29 | 53 | 40 | 6 |
| Cuba | 71 | 8 | - | - | - | - | - | 620 | 1 190 | 203 | - |
| USA | 98 | - | 193 | - | 341 | 18 | 174 | - | 6 | - | - |
| Others | 589 | 443 | 337 | 949 | 1 129 | 653 | 1 333 | 526 | 236 | 796 | 1 136 |
| Total | 5 145 | 3 350 | 4 596 | 6 340 | 8 420 | 5 984 | 14 891 | 8 503 | 10 561 | 11 407 | 14 692 |

Source: EUROSTAT.

Table 89 Spanish exports of sharks by country of destination in tonnes

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------|-----------|-----------|------------|------------|------------|--------------|--------------|--------------|--------------|---------------|---------------|
| Italy | 28 | 18 | 35 | 72 | 191 | 1 365 | 2 034 | 3 411 | 4 916 | 5 816 | 6 979 |
| Seychelles | - | - | - | - | - | - | - | - | - | 910 | 3 552 |
| Hong Kong | - | - | - | 60 | 272 | 305 | 61 | 85 | 90 | 633 | 1 291 |
| Uruguay | - | - | - | - | - | - | - | - | 302 | 989 | 1 014 |
| Madagascar | - | - | - | - | - | - | - | - | - | - | 575 960 |
| Mauritius | - | - | - | - | - | - | - | 8 | - | 1 396 | 946 |
| Greece | - | - | - | - | - | 10 | - | 63 | 132 | 193 | 483 |
| Algeria | - | - | - | - | - | - | - | 6 | 62 | 263 | 474 |
| Portugal | 3 | 6 | - | 8 | 64 | 411 | 275 | 199 | 454 | 443 | 430 |
| UK | - | - | - | - | - | 264 | - | 21 | 42 | 130 | 327 |
| Japan | - | - | 116 | 148 | 65 | 110 | 58 | 226 | 321 | 256 | 216 |
| China | - | - | - | - | - | 29 | 24 | 88 | 147 | 192 | 141 |
| France | 10 | - | 12 | - | 21 | - | 23 | 196 | 55 | 15 | 57 |
| United Arab Emirates | - | - | - | - | - | 53 | 268 | 164 | 149 | 47 | 50 |
| Germany | 3 | - | - | - | - | 3 | 4 | 3 | 2 | 184 | 38 |
| Thailand | - | - | - | - | - | 10 | 105 | 33 | 78 | 24 | 32 |
| Singapore | - | - | - | - | - | 51 | 70 | 37 | 58 | 2 | 12 |
| Cuba | - | - | - | - | - | - | - | 20 | - | 132 | - |
| Others | 2 | 2 | 104 | - | - | 20 | 6 | 54 | 66 | 190 | 460 |
| Total | 46 | 26 | 267 | 288 | 613 | 2 631 | 2 928 | 4 614 | 6 874 | 12 390 | 17 462 |

Source: EUROSTAT.

Table 90 Spanish exports of sharks by country of destination in US\$ 1 000

| Country | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------------|------------|------------|------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|
| Italy | 136 | 93 | 74 | 166 | 400 | 1 888 | 6 897 | 5 125 | 6 925 | 8 759 | 10 120 |
| Hong Kong | - | - | - | 540 | 2 826 | 2 164 | 642 | 663 | 1 035 | 6 442 | 9 704 |
| Seychelles | - | - | - | - | - | - | - | - | - | 1 205 | 3 763 |
| Japan | - | - | 419 | 986 | 810 | 889 | 605 | 2 715 | 3 505 | 2 879 | 1 540 |
| Uruguay | - | - | - | - | - | - | - | - | 270 | 1 073 | 1 222 |
| Madagascar | - | - | - | - | - | - | - | - | - | - | 560 962 |
| Portugal | 5 | 11 | - | 42 | 208 | 603 | 656 | 666 | 1 484 | 763 | 917 |
| Mauritius | - | - | - | - | - | - | - | 17 | - | 1 325 | 896 |
| China | - | - | - | - | - | 297 | 307 | 1 006 | 1 505 | 1 946 | 796 |
| Greece | - | - | - | - | - | 25 | - | 94 | 169 | 286 | 664 |
| Algeria | - | - | - | - | - | - | - | 7 | 70 | 291 | 524 |
| United Arab Emirates | - | - | - | - | - | 287 | 2 496 | 1 473 | 1 491 | 493 | 401 |
| UK | - | - | - | - | - | 2 274 | - | 17 | 75 | 166 | 355 |
| Thailand | - | - | - | - | - | 23 | 1 327 | 215 | 184 | 71 | 217 |
| France | 85 | - | 55 | - | 34 | - | 74 | 293 | 105 | 46 | 170 |
| Singapore | - | - | - | - | - | 449 | 917 | 343 | 576 | 15 | 122 |
| Germany | 6 | - | - | - | - | 13 | 66 | 34 | 71 | 483 | 77 |
| Cuba | - | - | - | - | - | - | - | 59 | - | 313 | - |
| Others | 22 | 7 | 91 | 3 | 4 | 117 | 20 | 185 | 80 | 309 | 1 645 |
| Total | 254 | 111 | 639 | 1 737 | 4 282 | 9 029 | 14 007 | 12 912 | 17 545 | 27 425 | 34 095 |

Source: EUROSTAT.

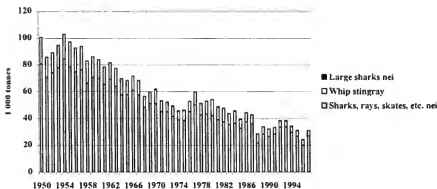
7.7 JAPAN

7.7.1 Catches

Japan has historically been one of the most important fishing nations for *Elasmobranchii*. There were already reports of shark fisheries 200 years ago when Japan began to export shark fins to China. Elasmobranch catches have decreased considerably from 100 700 tonnes in 1950 to nearly 31 000 tonnes in 1997. In 1950 Japan had the largest elasmobranch fishery in the world, taking 37.1% of the world catch. In 1997 this percentage was only 3.9% and Japan ranked seventh in the world. The 1940s and 1950s represent the period of most intensive fishing with an annual average of 92 600 tonnes in the 1950s. This has regularly decreased in the following decades to around 34 900 tonnes per year during the first half of the 1990s. 1996 was the lowest year with 24 200 tonnes.

No data is available on the composition of the catch by species. Only the group "large sharks" is identified in the FAO statistics. Reporting of this group began in 1965 and their catches have fluctuated since then from a low of 60 tonnes in 1975 to peak at 610 tonnes in 1981; 38 tonnes were caught in 1997. The great bulk of the catch consists of "*Elasmobranchii* not identified", 27 000 tonnes in 1997. In the period 1951-67¹⁴³, picked dogfish was the main species caught followed by blue shark and salmon shark (*Lamna ditropis*). After 1968 there are no indication of species in official Japanese statistics of landings and all sharks are combined into one category. At present, the most significant species is probably blue shark, followed by silky shark, oceanic whitetip shark and shortfin mako¹⁴⁴. There are also reports of thresher and hammerhead catches.

Figure 109 Japanese elasmobranch catches by species in 1 000 tonnes (1950-1997)



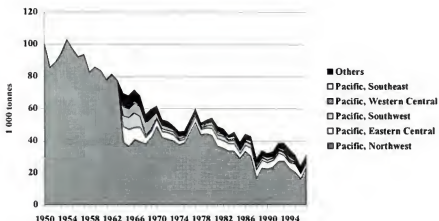
Source: FAO - FIDI.

¹⁴³ TANIUCHI T., "The role of *Elasmobranchii* in Japanese fisheries", NOAA technical report, NMFS 90-415-426, 1990.

¹⁴⁴ BONFIL R., *idem*.

Elasmobranchii are captured in many fishing areas but the bulk comes from the Northwest Pacific. Other important areas are the Central Eastern and Southwest Pacific, Western Indian Ocean and Central Western Pacific.

Figure 110 Japanese elasmobranch catches by fishing areas in 1 000 tonnes (1950-1997)



Source: FAO – FIDI.

The majority of the elasmobranch catch is composed of shark. According to Taniuchi¹⁴⁵, the relative importance of sharks declined from 4.3% of the total fish catches in 1949 to 0.3% in 1985. This seems to be due to a decrease in the relative value of elasmobranch together with a reduction in the Japanese elasmobranch stocks. Nowadays, elasmobranch constitute 0.55% of total Japanese catches, one of the lowest percentages among major elasmobranch fishing countries. Taniuchi reported a huge decrease in harvests of picked dogfish from more than 50 000 tonnes in 1952 to less than 10 000 tonnes in 1965. This probably indicates a decline in the size of stocks of this species, as landings of other sharks did not follow the same trend. Another important factor, which could explain the reduction in catches, is the change in consumer preferences associated with increasing purchasing power, which followed Japanese economic growth after the post-war period. So, the decrease in catches is probably because of falling market values for shark products, which prompted fisheries to target higher priced species.

Sharks are mainly captured as a bycatch by longline and trawl fisheries. There are exceptions, as a small-scale shark longline fishery, targeting salmon sharks, exists in northern Japanese coastal waters. According to Taniuchi and Ishihara¹⁴⁶, in the period 1976-85, 83% of Japanese elasmobranch catches were sharks and at least 63% of these sharks were captured as bycatch in tuna longline fisheries. In 1993, 77% of the total shark catch was by tuna longline. There are

¹⁴⁵ TANIUCHI T., *idem*.

¹⁴⁶ ISHIHARA H., "The skates and rays of the western North Pacific: an overview of their fisheries, utilization, and classification", NOAA technical report, NMFS 90:485-498, 1990.

estimates that 25% of catches on tuna vessels are sharks¹⁴⁷. A high percentage of the sharks captured as bycatch are discarded at sea, especially sharks that have low economic value. Discards of shark at sea amount to 2.8 times the landed shark bycatch of the longline tuna fishery. Fins are taken from almost all sharks and are typically divided among the vessel members, who then supply them directly to dealers.

7.7.2 Markets and trade

Japan has used shark species for a long time. In ancient times, dried shark meat was offered at Ise shrine, Japan's oldest shrine¹⁴⁸. The meat and cartilage of *Elasmobranchii* are used in traditional dishes, there are industrial and medicinal uses of liver oil compounds and the skins are used for making leather. In 1900 there was a government promotion of shark fisheries and industries based on the production of meat, cartilage, oil and fins¹⁴⁹.

Consumption of shark meat as steaks and fillets is limited. It is mainly used in the manufacture of *hanpen*, *kamaboko* and *yaki-chukawa*. Shark meat is consumed fresh, frozen, boiled, processed, as sashimi and surimi paste. Fresh shark meat is not popular but it is eaten occasionally in restaurants. Starspotted smooth-hound meat is eaten boiled. Boiled shark meat is called *yubiki*. In Aomori and Nagasaki prefecture meat is eaten as *yubiki* with *sumiso* (a traditional Japanese soya-based condiment)¹⁵⁰. Shortfin mako and thresher sharks are the preferred species for frozen meat. Picked dogfish, shortfin mako shark and starspotted smooth-hound are considered suitable for sashimi as they do not have a strong ammonia taste. In North Japan limited amounts of sharks are consumed in steak form, and the favoured species are those with fibrous meat, such as hammerhead and picked dogfish. According to Kreuzer and Ahmed, *hoshi zame* (*Mustelus manazo*) is a popular shark species in Japan. It is chopped up fresh and boiled in water then eaten with a vinegar and bean paste. It is also sometimes salted and dried and then cooked the same way. *Nezumizame* (*Vulpecula marina*) is boiled and sometimes roasted. There are also reports that blue sharks are used for sashimi¹⁵¹ but usually meat of blue shark is manufactured into fish paste, which can only be done if it has been promptly processed within two hours of capture, in order to avoid its strong odour. Shark paste is consumed as *hanpen*. *Kamaboko* is also a paste product and one of the oldest traditional fish products in Japan. It uses only a small proportion of fish meat and shark meat forms part of that. *Age kamaboko* (fried *kamaboko*) uses the maximum amount of fish meat, around 30% of its total composition¹⁵². *Yaki-chukawa* is used in Oden cooking in the winter season. Shark ovaries are used to prepare *atsuyaki*, a kind of fish paste¹⁵³.

Makos, thresher and *Carcharhinidae* sharks command higher prices than other species on the Japanese market. Mako is the most highly regarded species. It is marketed frozen, its meat is used for sashimi and the fins are judged of good quality. Salmon shark is usually consumed in

¹⁴⁷ TANIUCHI T., "Should sharks be conserved?" Umi no seisanyoku to sakana. Koseisha Koseikaku, 1995.

¹⁴⁸ YANO K., "Gulper shark" Basic data of Japanese rare aquatic wildlife II. Ministry of Agriculture, Forestry and Fisheries, the Fisheries Agency: pp. 179-184, 1986, 1995.

¹⁴⁹ KIYONO H., *idem*.

¹⁵⁰ KIYONO H., *idem*.

¹⁵¹ PAUST B., SMITH R., "Salmon shark manual" AK-SG-86-01. Alaska Sea Grant College Program, University of Alaska, Fairbanks, 1986.

¹⁵² KREUZER R., AHMED R., *idem*.

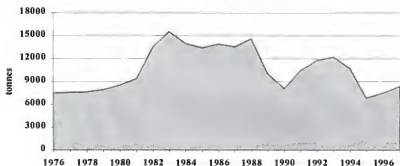
¹⁵³ GORDIEVSKAYA V.S. "Shark flesh in the food industry", US Department of Commerce. National technical information service, Springfield, 1973.

northern Honshu and the heart of salmon shark is eaten as sashimi in Kesenuma but only limited amounts of this species are eaten in the rest of the country. It is usually exported, together with porbeagles, to Europe.

The price for whole gutted shark without the fins in landing ports in Japan is about 100 yen/kg (US\$ 0.78/kg). Prices are particularly low at the moment as there is a wide variety of other fish available for surimi production. Flesh of mako shark and blue shark is sold in the Tokyo Tsukiji market for about 250 yen/kg (US\$ 1.96/kg).

According to FAO statistics, in 1997 Japan ranked third after Pakistan and the USA as an elasmobranch producer with about 8 400 tonnes. Its production was more significant in the 1980s, peaking at 15 600 tonnes in 1983. Since 1981 only production of frozen sharks has been reported but, in previous years, dried, unsalted shark fins (833 tonnes in 1980) and shark liver oil (130 tonnes in 1980) were also manufactured.

Figure 111 Japanese production of frozen shark in tonnes

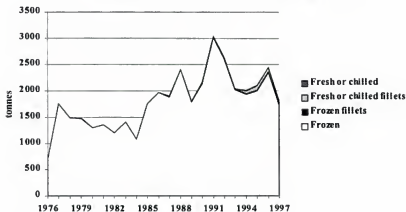


Source: FAO - FIDI.

Japan is an important trader in fresh and frozen shark meat. In 1997 Japan imported 1 810 tonnes, valued US\$17.9 million. Most imports consist of frozen whole carcasses with a limited amount of fresh sharks and some fillets. Imports of fresh fillets have increased in the last few years and nearly reached 100 tonnes in 1996 (FAO statistics), but in 1997 they have declined to 35 tonnes. Data from the Japan Marine Product Importers Association indicate that in 1997 Japan imported 1 730 tonnes of frozen sharks worth US\$16.8 million, a decline of 26.2% in volume and 6.6% in value compared with 2 350 tonnes worth US\$18.0 million in the previous year. This marks a 42.3% decrease from the peak of 3 000 tonnes in 1991. In 1997 Spain became the main supplier for the first time with 508 tonnes worth US\$6.9 million. Canada, Ecuador, the USA, Taiwan Province of China, New Zealand, and China were the other major suppliers but imports from Canada showed a substantial decline from the previous year's 840 tonnes to only 260 tonnes. However, Canada's exports of sharks to Japan in 1996 were almost double those of the previous year. Spanish exports to Japan have substantially increased during the last few years, peaking at 540 tonnes in 1996, as have those from China, which grew from 8 tonnes in 1992 to 133 tonnes in 1996, declining to 85 tonnes in 1997. Supplies from Republic of Korea and Taiwan Province of China have gone in the opposite direction. Until a few years ago Taiwan Province of China was

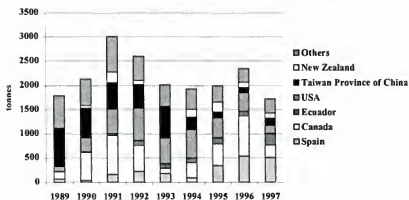
the main supplier of frozen sharks to Japan. In 1989 it exported 790 tonnes but by 1997 this had fallen to 150 tonnes. Imports from Republic of Korea declined from 340 tonnes in 1989 to 47 tonnes in 1997.

Figure 112 Japanese imports of sharks by product form in tonnes



Source: FAO – FIDI.

Figure 113 Japanese imports of frozen sharks by country of origin in tonnes

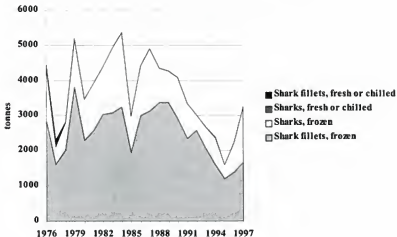


Source: Japan Marine Product Importers Association

Japanese exports of shark meat consist mainly of frozen sharks. In 1997 Japan was the leading exporting country of frozen shark fillets followed by New Zealand and UK, according to FAO statistics. Japanese national statistics show Japan exporting 1 570 tonnes of frozen sharks

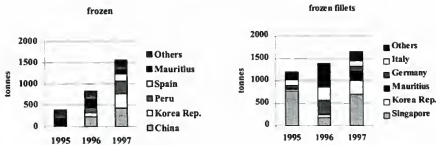
worth US\$3.2 million and 1 660 tonnes of frozen shark fillets worth US\$6.4 million in 1997. The main destination countries of frozen sharks were China, Republic of Korea, Peru, Spain and Mauritius, while frozen shark fillets went to Singapore (41.9%), Republic of Korea, Mauritius, Germany and Italy in that year.

Figure 114 Japanese exports of sharks in tonnes



Source: FAO - FIDI.

Figure 115 Japanese exports of sharks in tonnes



Source: Japanese Ministry of Finance

There are reports of Japanese exports of shark fins to China more than 200 years ago. In the 1940s the trade in shark fins ceased but it restarted after the Second World War. Japan is one of the major producers of shark fins in the world but this production was only reported in FAO statistics until 1980.

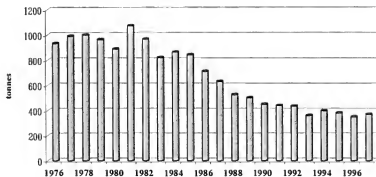
Table 91 Japanese production of dried, unsalted shark fins in tonnes

| 1976 | 1977 | 1978 | 1979 | 1980 |
|------|------|------|------|------|
| 894 | 871 | 613 | 749 | 833 |

Source: FAO – FIDI.

Fins from Japanese vessels are judged to be better quality than those from Korean vessels as Japanese fishermen cut differently, to include the meat at the base of the tail. The fins are processed by dealers. There are two types of fins. One is called *suboshi* (dried fins with skin) and the other *sumuki* (dried fins without skin). There are two types of *suboshi*: *funaboshi* are fins dried through direct exposure to the sun for a short period on the distant-water tuna longline vessels and *okaboshi* are fins dried on land. *Funaboshi* are considered to be lesser quality than *okaboshi* and are usually exported to Hong Kong. *Sumuki* is more expensive than *suboshi* as it takes 1-2 months to prepare; fins are boiled, skinless, and dried. Usually the tail fin is processed as *suboshi* and the others as *sumuki*¹⁵⁴.

The bulk of Japanese shark fin production is exported. Shark fin soup is not traditional in Japanese cuisine as it is in Chinese. There is very limited consumption at home, mainly in Chinese restaurants. The fins of mako, hammerhead and sandbar are preferred, as are big fins compared to small ones. Fins of blue and salmon sharks are considered to be lower quality but are more available and less expensive. From blue sharks, only the lower section of the tail fin of is used to prepare soup.

Figure 116 Japanese exports of dried, unsalted shark fins in tonnes

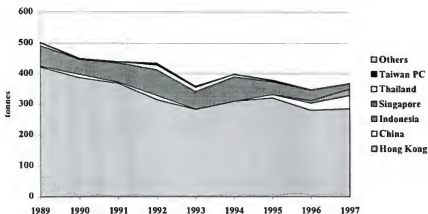
Source: FAO – FIDI.

Imports of shark fin are not reported in Japanese statistics but, according to the records of Japanese trading partners, Japan imports only limited amounts of shark fin, mainly from Taiwan Province of China, compared with other Asian countries. These imports are often re-exported to countries such as Hong Kong and Singapore. According to Japanese national statistics, Japan exported 370 tonnes of dried shark fins worth US\$13.5 million in 1997. Hong Kong took 286

¹⁵⁴ KIYONO H., *idem*.

tonnes worth US\$11.9 million, followed by China, Indonesia, and Singapore. The volume of Japanese exports of shark fins have declined regularly from 1 070 tonnes in 1981 to 370 tonnes in 1997. According to FAO statistics, Japan was the leading exporter of dried, unsalted shark fins in value in 1997 followed by Indonesia and Maldives.

Figure 117 Japanese exports of dried, unsalted shark fins in tonnes



Source: Japanese Ministry of Finance.

Shark fin prices are high but vary widely depending upon size, species, which fin it is, the condition of the fin and whether it is fresh, frozen or dried and, if dried, how dry. Yokohama Chinese restaurant suppliers report buying shark fins for about 3 000 yen/kg (US\$23.5/kg).

Japan also produces artificial shark fins. This product has the appearance and, to some extent, the texture of shark fins. Restaurants usually mix these artificial fins with genuine shark fins in a 30:70 ratio. This cheap product is generally exported.

Japan used to be one of the world's major producers and exporters of shark liver oil. Between 1926 and 1940 Japan produced more than 3 800 tonnes annually on average. This declined in the following decades to average 220 tonnes per annum between 1973 and 1980. Production statistics have not been available since 1980. During the Second World War shark oil was used as a lubricant in combat aircraft and there was a substantial increase in demand. Statistics on Japanese exports and imports of shark liver oil are also unavailable, as shark oil is included in the general category of fish oil. Oil is an important component of cosmetics and health products. Capsules made from shark liver oil extract sold are sold at prices ranging from US\$16.00 to US\$27.00 per 450mg bottle. Shark oil is sold at US\$17.00 per 50.3ml bottle. Face, hand and body creams prepared with squalene are marketed at US\$11.00 per 240ml container. Shark oil is also used in sanitary wipes used for cleaning toilets¹⁵⁵.

¹⁵⁵ KIYONO H., *idem*.

Table 92 Japanese production of shark liver oil in tonnes

| 1976 | 1977 | 1978 | 1979 | 1980 |
|------|------|------|------|------|
| 211 | 422 | 146 | 139 | 130 |

Source: FAO - FIDI.

Japan, the USA and Australia are the major shark cartilage producing countries. Japan produces shark cartilage powder and capsules. These products are marketed for domestic use but they are also exported to countries such as the USA and Mexico and imported from the USA, New Zealand and Australia. Chondroitin sodium is a component found in shark cartilage and it is used in Japan as a treatment for eye fatigue and rheumatism, with blue shark cartilage particularly appreciated.

Flawed shark skins are processed to make the gelatinous food *nikogori*. Shark skin is used in limited amounts in the manufacture of handbags, belts and watchbands.

Table 93 Japanese elasmobranch catches by species in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|----------------|---------------|---------------|---------------|----------------|---------------|---------------|---------------|---------------|---------------|
| Sharks, rays, skates, etc. nei | 80 700 | 70 700 | 74 100 | 77 600 | 84 500 | 78 500 | 74 600 | 76 200 | 66 100 | 70 500 |
| Whip stingray | 20 000 | 15 000 | 15 000 | 17 100 | 18 400 | 18 700 | 18 000 | 17 600 | 16 800 | 15 500 |
| Large sharks nei | - | - | - | - | - | - | - | - | - | - |
| Total | 100 700 | 85 700 | 89 100 | 94 700 | 102 900 | 97 200 | 92 600 | 93 800 | 82 900 | 86 000 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Sharks, rays, skates, etc. nei | 69 700 | 65 300 | 69 100 | 63 700 | 57 500 | 57 800 | 60 900 | 57 500 | 48 500 | 51 200 |
| Whip stingray | 14 200 | 13 000 | 12 400 | 13 700 | 12 100 | 10 300 | 10 700 | 10 600 | 8 000 | 8 500 |
| Large sharks nei | - | - | - | - | - | 100 | 100 | - | - | - |
| Total | 83 900 | 78 300 | 81 500 | 77 400 | 69 600 | 68 200 | 71 700 | 68 100 | 56 500 | 59 700 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Sharks, rays, skates, etc. nei | 51 000 | 45 100 | 44 800 | 41 700 | 38 969 | 38 456 | 44 978 | 50 245 | 42 844 | 43 412 |
| Whip stingray | 10 200 | 7 700 | 7 000 | 7 500 | 6 424 | 7 684 | 7 819 | 9 365 | 8 263 | 9 496 |
| Large sharks nei | 600 | 400 | 400 | 200 | 322 | 58 | 85 | 104 | 74 | 102 |
| Total | 61 800 | 53 200 | 52 200 | 49 400 | 45 715 | 46 198 | 52 882 | 59 714 | 51 181 | 53 010 |
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Sharks, rays, skates, etc. nei | 42 188 | 39 032 | 37 364 | 35 530 | 36 422 | 32 644 | 37 572 | 35 846 | 21 811 | 28 378 |
| Whip stingray | 11 882 | 9 400 | 9 990 | 8 083 | 9 047 | 6 577 | 6 609 | 6 799 | 6 637 | 5 350 |
| Large sharks nei | 228 | 609 | 226 | 85 | 213 | 214 | 231 | 232 | 168 | 176 |
| Total | 54 298 | 49 041 | 47 580 | 43 698 | 45 682 | 39 435 | 44 412 | 42 877 | 28 616 | 33 904 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Sharks, rays, skates, etc. nei | 26 471 | 28 386 | 33 536 | 33 739 | 29 827 | 26 764 | 19 939 | 26 998 | | |
| Whip stingray | 5 492 | 4 778 | 4 585 | 4 247 | 4 041 | 3 985 | 4 029 | 3 959 | | |
| Large sharks nei | 140 | 198 | 345 | 553 | 450 | 397 | 238 | 38 | | |
| Total | 32 103 | 33 362 | 38 466 | 38 539 | 34 318 | 31 146 | 24 206 | 30 995 | | |

Source: FAO-FIDI

Table 94 Japanese elasmobranch catches by fishing areas in tonnes

| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|----------------|---------------|---------------|---------------|----------------|---------------|---------------|---------------|---------------|---------------|
| Pacific, Northwest | 100 700 | 85 700 | 89 100 | 94 700 | 102 900 | 97 200 | 92 600 | 93 800 | 82 900 | 86 000 |
| Pacific, Eastern Central | - | - | - | - | - | - | - | - | - | - |
| Pacific, Southwest | - | - | - | - | - | - | - | - | - | - |
| Indian Ocean, Western | - | - | - | - | - | - | - | - | - | - |
| Pacific, Western Central | - | - | - | - | - | - | - | - | - | - |
| Indian Ocean, Eastern | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Eastern Central | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southeast | - | - | - | - | - | - | - | - | - | - |
| Pacific, Southeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northeast | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Southwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Northwest | - | - | - | - | - | - | - | - | - | - |
| Atlantic, Western Central | - | - | - | - | - | - | - | - | - | - |
| Mediterranean and Black Sea | - | - | - | - | - | - | - | - | - | - |
| Pacific, Northeast | - | - | - | - | - | - | - | - | - | - |
| Total | 100 700 | 85 700 | 89 100 | 94 700 | 102 900 | 97 200 | 92 600 | 93 800 | 82 900 | 86 000 |
| | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 |
| Pacific, Northwest | 83 900 | 78 300 | 81 500 | 77 400 | 39 400 | 36 800 | 41 100 | 39 700 | 38 400 | 42 400 |
| Pacific, Eastern Central | - | - | - | - | 9 700 | 10 400 | 7 300 | 8 900 | 3 900 | 3 900 |
| Pacific, Southwest | - | - | - | - | 6 500 | 7 400 | 8 900 | 6 800 | 1 400 | 700 |
| Indian Ocean, Western | - | - | - | - | 2 300 | 1 300 | 1 900 | 2 400 | 1 900 | 2 200 |
| Pacific, Western Central | - | - | - | - | 5 600 | 5 400 | 6 200 | 6 000 | 7 800 | 6 900 |
| Indian Ocean, Eastern | - | - | - | - | 1 800 | 1 200 | 800 | 1 900 | 1 100 | 1 200 |
| Atlantic, Eastern Central | - | - | - | - | 500 | 1 000 | 400 | 300 | 400 | 300 |
| Atlantic, Southeast | - | - | - | - | 800 | 1 300 | 1 800 | 500 | 300 | 400 |
| Pacific, Southeast | - | - | - | - | 900 | 600 | 1 200 | 700 | 600 | 800 |
| Atlantic, Northeast | - | - | - | - | - | 100 | 100 | - | - | 0 |
| Atlantic, Southwest | - | - | - | - | 600 | 600 | 600 | 200 | 100 | 200 |
| Atlantic, Northwest | - | - | - | - | - | 100 | 100 | - | - | - |
| Atlantic, Western Central | - | - | - | - | 800 | 800 | 700 | 200 | 100 | 200 |
| Mediterranean and Black Sea | - | - | - | - | 700 | 1 200 | 600 | 500 | 500 | 500 |
| Pacific, Northeast | - | - | - | - | - | - | - | - | - | - |
| Total | 83 900 | 78 300 | 81 500 | 77 400 | 69 600 | 68 200 | 71 700 | 68 100 | 56 500 | 59 700 |
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
| Pacific, Northwest | 49 100 | 42 300 | 41 200 | 40 200 | 37 842 | 39 088 | 45 452 | 51 776 | 44 085 | 44 631 |
| Pacific, Eastern Central | 4 500 | 3 600 | 4 200 | 3 800 | 2 504 | 1 983 | 3 099 | 3 386 | 3 154 | 3 575 |
| Pacific, Southwest | 700 | 1 700 | 1 300 | 1 800 | 887 | 1 514 | 1 756 | 1 893 | 804 | 1 319 |
| Indian Ocean, Western | 1 000 | 1 000 | 1 200 | 400 | 754 | 497 | 153 | 103 | 251 | 132 |
| Pacific, Western Central | 3 200 | 2 200 | 2 000 | 1 400 | 1 645 | 1 187 | 1 067 | 827 | 839 | 1 479 |
| Indian Ocean, Eastern | 700 | 800 | 400 | 300 | 434 | 538 | 227 | 218 | 210 | 546 |
| Atlantic, Eastern Central | 400 | 200 | 300 | 100 | 458 | 575 | 151 | 224 | 322 | 108 |
| Atlantic, Southeast | 300 | 500 | 500 | 500 | 352 | 272 | 359 | 387 | 370 | 329 |
| Pacific, Southeast | 600 | 200 | 400 | 500 | 422 | 321 | 441 | 752 | 944 | 728 |

Table 94 Japanese elasmobranch catches by fishing areas in tonnes (continued)

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Atlantic, Northeast | - | - | - | - | 17 | 8 | 6 | 12 | 11 | 3 |
| Atlantic, Southwest | 500 | 100 | 200 | 100 | 3 | 1 | 0 | 0 | 106 | 47 |
| Atlantic, Northwest | 600 | 400 | 400 | 200 | 322 | 58 | 85 | 104 | 74 | 102 |
| Atlantic, Western Central | 200 | 200 | 100 | 100 | 74 | 147 | 76 | 32 | 4 | 11 |
| Mediterranean and Black Sea | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pacific, Northeast | 0 | 0 | 0 | 0 | 1 | 9 | 10 | 0 | 7 | 0 |
| Total | 61 800 | 53 200 | 52 200 | 49 400 | 45 715 | 46 198 | 52 882 | 59 714 | 51 181 | 53 010 |
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Pacific, Northwest | 43 571 | 36 926 | 35 674 | 33 935 | 33 848 | 29 219 | 33 642 | 30 771 | 16 783 | 23 177 |
| Pacific, Eastern Central | 4 279 | 4 680 | 4 702 | 4 531 | 4 502 | 3 361 | 3 910 | 5 023 | 5 281 | 4 869 |
| Pacific, Southwest | 2 018 | 2 362 | 2 502 | 1 588 | 2 250 | 1 792 | 2 276 | 2 185 | 2 319 | 1 691 |
| Indian Ocean, Western | 200 | 183 | 161 | 270 | 344 | 350 | 300 | 528 | 296 | 212 |
| Pacific, Western Central | 1 875 | 1 544 | 1 330 | 953 | 1 085 | 871 | 644 | 514 | 638 | 563 |
| Indian Ocean, Eastern | 410 | 750 | 369 | 477 | 472 | 903 | 769 | 297 | 347 | 446 |
| Atlantic, Eastern Central | 411 | 378 | 527 | 315 | 465 | 626 | 305 | 517 | 334 | 662 |
| Atlantic, Southeast | 548 | 378 | 717 | 225 | 582 | 652 | 710 | 589 | 641 | 868 |
| Pacific, Southeast | 713 | 846 | 771 | 1 178 | 1 327 | 521 | 663 | 1 754 | 1 297 | 818 |
| Atlantic, Northeast | 18 | 24 | 28 | 68 | 33 | 29 | 8 | 22 | 19 | 26 |
| Atlantic, Southwest | 24 | 146 | 221 | 2 | 405 | 694 | 838 | 339 | 356 | 141 |
| Atlantic, Northwest | 228 | 609 | 226 | 85 | 213 | 214 | 231 | 232 | 168 | 176 |
| Atlantic, Western Central | 3 | 134 | 155 | 36 | 57 | 71 | 25 | 44 | 27 | 139 |
| Mediterranean and Black Sea | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Pacific, Northeast | 0 | 81 | 197 | 35 | 97 | 132 | 91 | 62 | 110 | 116 |
| Total | 54 298 | 49 041 | 47 580 | 43 698 | 45 682 | 39 435 | 44 412 | 42 877 | 28 616 | 33 904 |
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | | |
| Pacific, Northwest | 22 515 | 23 785 | 27 328 | 27 577 | 22 905 | 20 618 | 16 585 | 24 144 | | |
| Pacific, Eastern Central | 3 984 | 4 176 | 5 322 | 3 591 | 3 645 | 5 215 | 2 982 | 2 703 | | |
| Pacific, Southwest | 1 587 | 1 369 | 1 625 | 1 675 | 1 022 | 862 | 901 | 846 | | |
| Indian Ocean, Western | 166 | 135 | 321 | 196 | 502 | 282 | 620 | 635 | | |
| Pacific, Western Central | 346 | 536 | 811 | 780 | 1 124 | 480 | 246 | 515 | | |
| Indian Ocean, Eastern | 201 | 550 | 164 | 244 | 185 | 554 | 437 | 485 | | |
| Atlantic, Eastern Central | 652 | 434 | 521 | 1 412 | 977 | 925 | 729 | 482 | | |
| Atlantic, Southeast | 691 | 717 | 658 | 1 140 | 1 295 | 676 | 398 | 473 | | |
| Pacific, Southeast | 1 409 | 857 | 1 032 | 996 | 1 415 | 671 | 857 | 372 | | |
| Atlantic, Northeast | 62 | 91 | 107 | 174 | 168 | 376 | 132 | 211 | | |
| Atlantic, Southwest | 205 | 375 | 185 | 185 | 581 | 65 | 69 | 62 | | |
| Atlantic, Northwest | 140 | 198 | 345 | 553 | 450 | 397 | 238 | 38 | | |
| Atlantic, Western Central | 103 | 66 | 7 | 13 | 30 | 17 | 9 | 27 | | |
| Mediterranean and Black Sea | 0 | 0 | 1 | 3 | 5 | 8 | 3 | 2 | | |
| Pacific, Northeast | 42 | 73 | 39 | 0 | 14 | 0 | 0 | 0 | | |
| Total | 32 103 | 33 362 | 38 466 | 38 539 | 34 318 | 31 146 | 24 206 | 30 995 | | |

Source: FAO - FIDI.

Table 95 Japanese imports of frozen shark by country of origin in tonnes

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Spain | 74 | 40 | 161 | 229 | 184 | 93 | 345 | 536 | 508 |
| Canada | 149 | 576 | 803 | 531 | 102 | 306 | 444 | 837 | 258 |
| Ecuador | 2 | 12 | 45 | 108 | 99 | 100 | 135 | 97 | 243 |
| USA | 102 | 292 | 505 | 668 | 530 | 586 | 407 | 383 | 169 |
| Taiwan Province of China | 792 | 612 | 547 | 488 | 648 | 266 | 124 | 110 | 149 |
| New Zealand | - | 64 | 216 | 85 | 12 | 161 | 207 | 109 | 104 |
| China | - | - | - | 8 | 37 | 40 | 117 | 133 | 85 |
| Korea Rep | 343 | 198 | 237 | 144 | 75 | 91 | 17 | 25 | 47 |
| Panama | 33 | 35 | 19 | 31 | 13 | 42 | 49 | 37 | 37 |
| Trinidad | - | - | - | - | - | - | - | - | 34 |
| American Samoa | - | - | 8 | - | 18 | - | - | - | 26 |
| Hong Kong | - | - | - | 41 | 5 | 29 | 32 | - | 21 |
| Kenya | - | - | - | 16 | 11 | 30 | 40 | 25 | 17 |
| Honduras | 17 | 11 | 21 | 16 | 18 | 10 | 6 | 19 | 12 |
| New Caledonia | - | - | 1 | - | 4 | 16 | 8 | 12 | 9 |
| Uruguay | - | - | - | 5 | - | - | - | - | 4 |
| South Africa | - | 1 | 1 | 2 | - | - | - | - | 4 |
| Belize | - | - | - | - | - | - | - | 2 | 2 |
| Gambia | 5 | 7 | - | - | - | - | - | - | 2 |
| Mexico | - | - | 0 | - | - | - | - | - | 2 |
| Sri Lanka | - | - | - | - | - | - | - | 2 | 1 |
| Viet Nam | - | - | - | - | - | - | - | - | 0 |
| Guinea | - | - | - | - | - | - | - | 10 | - |
| Chile | 71 | 3 | - | - | - | 3 | 3 | 6 | - |
| Iceland | - | - | - | - | - | - | - | 4 | - |
| Portugal | - | 17 | 21 | 4 | 7 | - | 4 | 2 | - |
| Fiji | 9 | - | 38 | 50 | 51 | 58 | 32 | - | - |
| UK | - | - | - | - | - | - | 20 | - | - |
| Mozambique | 24 | 82 | 97 | 34 | 36 | 39 | 5 | - | - |
| Indonesia | 26 | 21 | 89 | 65 | 73 | 16 | 3 | - | - |
| Sierra Leone | - | - | - | - | - | - | 3 | - | - |
| India | - | - | - | - | - | 6 | - | - | - |
| Iran | - | - | - | - | 25 | 3 | - | - | - |
| Singapore | 32 | 50 | 80 | 38 | 3 | 0 | - | - | - |
| Papua New Guinea | - | - | - | - | - | 20 | - | - | - |
| Madagascar | - | 5 | 21 | 21 | 31 | 9 | - | - | - |
| St Vincent | - | 4 | 4 | 9 | 18 | 9 | - | - | - |
| Australia | 1 | - | - | - | - | 5 | - | - | - |
| Italy | - | - | - | - | 12 | - | - | - | - |
| Peru | 3 | 9 | 8 | 2 | 5 | - | - | - | - |
| Malta | - | - | - | - | 2 | - | - | - | - |
| Côte d'Ivoire | - | - | - | - | 0 | - | - | - | - |
| F Ocean | 15 | 42 | 58 | 5 | - | - | - | - | - |
| France | - | - | 28 | - | - | - | - | - | - |
| Brazil | - | - | 2 | - | - | - | - | - | - |
| Malaysia | - | - | 1 | - | - | - | - | - | - |
| Neth. Antilles | 56 | 31 | - | - | - | - | - | - | - |
| Venezuela | 8 | 13 | - | - | - | - | - | - | - |
| Others | 34 | 11 | - | - | - | - | - | - | - |
| Total | 1 796 | 2 134 | 3 011 | 2 601 | 2 019 | 1 935 | 2 001 | 2 346 | 1 732 |

Source: Japan Marine Product Importers Association.

Table 96 Japanese imports of frozen shark by country of origin in US\$ 1 000

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--------------------------|--------------|--------------|--------------|---------------|---------------|--------------|---------------|---------------|---------------|
| Spain | 505 | 238 | 1 179 | 2 870 | 2 692 | 1 928 | 4 483 | 6 561 | 6 867 |
| China | - | - | - | 1 046 | 3 276 | 2 970 | 7 718 | 7 193 | 5 003 |
| Taiwan Province of China | 2 787 | 2 244 | 2 277 | 1 654 | 1 120 | 366 | 202 | 192 | 1 617 |
| Ecuador | 4 | 85 | 242 | 424 | 830 | 620 | 779 | 888 | 1 484 |
| Canada | 228 | 1 026 | 1 388 | 969 | 177 | 578 | 808 | 1 502 | 411 |
| USA | 163 | 569 | 907 | 1 372 | 1 153 | 1 283 | 856 | 836 | 354 |
| Panama | 52 | 44 | 31 | 57 | 23 | 71 | 133 | 230 | 255 |
| Hong Kong | - | - | - | 556 | 409 | 320 | 414 | - | 237 |
| New Zealand | - | 104 | 359 | 67 | 27 | 348 | 529 | 235 | 221 |
| Korea Rep | 471 | 277 | 383 | 229 | 101 | 121 | 24 | 31 | 74 |
| Kenya | - | - | - | 35 | 13 | 61 | 98 | 39 | 57 |
| Honduras | 25 | 14 | 51 | 22 | 47 | 13 | 59 | 110 | 54 |
| Trinidad | - | - | - | - | - | - | - | - | 52 |
| New Caledonia | - | - | 2 | - | 23 | 80 | 48 | 55 | 38 |
| American Samoa | - | - | 10 | - | 33 | - | - | - | 33 |
| Mexico | - | - | 2 | - | - | - | - | - | 13 |
| South Africa | - | 2 | 4 | 6 | - | - | - | - | 13 |
| Uruguay | - | - | - | 8 | - | - | - | - | 7 |
| Gambia | 8 | 8 | - | - | - | - | - | - | 5 |
| Belize | - | - | - | - | - | - | - | 2 | 3 |
| Sri Lanka | - | - | - | - | - | - | - | 2 | 2 |
| Viet Nam | - | - | - | - | - | - | - | - | 2 |
| Guinea | - | - | - | - | - | - | - | 79 | - |
| Chile | 65 | 4 | - | - | - | 2 | 6 | 12 | - |
| Portugal | - | 84 | 104 | 25 | 55 | - | 17 | 9 | - |
| Iceland | - | - | - | - | - | - | - | 6 | - |
| Indonesia | 29 | 24 | 147 | 97 | 141 | 77 | 128 | - | - |
| UK | - | - | - | - | - | - | 73 | - | - |
| Fidji | 11 | - | 62 | 75 | 52 | 67 | 29 | - | - |
| Mozambique | 32 | 108 | 121 | 42 | 46 | 52 | 8 | - | - |
| Sierra Leone | - | - | - | - | - | - | 4 | - | - |
| Australia | 8 | - | - | - | - | 211 | - | - | - |
| Papua New Guinea | - | - | - | - | - | 36 | - | - | - |
| Madagascar | - | 33 | 21 | 25 | 40 | 14 | - | - | - |
| St Vincent | - | 4 | 6 | 17 | 21 | 13 | - | - | - |
| Singapore | 157 | 554 | 1394 | 403 | 246 | 11 | - | - | - |
| Iran | - | - | - | - | 32 | 7 | - | - | - |
| India | - | - | - | - | - | 6 | - | - | - |
| Italy | - | - | - | - | 45 | - | - | - | - |
| Peru | 19 | 120 | 96 | 30 | 16 | - | - | - | - |
| Malta | - | - | - | - | 12 | - | - | - | - |
| Côte d'Ivoire | - | - | - | - | 6 | - | - | - | - |
| F Ocean | 21 | 69 | 87 | 5 | - | - | - | - | - |
| France | - | - | 48 | - | - | - | - | - | - |
| Brazil | - | - | 10 | - | - | - | - | - | - |
| Malaysia | - | - | 2 | - | - | - | - | - | - |
| Neth. Antilles | 88 | 49 | - | - | - | - | - | - | - |
| Venezuela | 8 | 4 | - | - | - | - | - | - | - |
| Others | 85 | 14 | - | - | - | - | - | - | - |
| Total | 4 766 | 5 678 | 8 933 | 10 034 | 10 636 | 9 255 | 16 416 | 17 982 | 16 802 |

Source: Japan Marine Product Importers Association

Table 97 Japanese exports of frozen shark by country of destination

| Country | 1995 | | 1996 | | 1997 | |
|--------------|------------|--------------|------------|--------------|--------------|--------------|
| | Tonnes | US\$ 1 000 | Tonnes | US\$ 1 000 | Tonnes | US\$ 1 000 |
| China | 10 | 17 | 232 | 130 | 429 | 1 017 |
| Korea Rep. | 19 | 44 | 91 | 196 | 341 | 371 |
| Peru | - | - | 118 | 52 | 296 | 129 |
| Spain | - | - | 1 | 2 | 166 | 87 |
| Mauritius | 166 | 585 | 206 | 816 | 106 | 428 |
| Singapore | 43 | 138 | 14 | 105 | 72 | 256 |
| USA | 13 | 65 | 45 | 286 | 62 | 313 |
| Hong Kong | - | - | 26 | 282 | 45 | 475 |
| South Africa | 3 | 3 | 23 | 30 | 24 | 38 |
| Australia | - | - | - | - | 22 | 33 |
| Slovenia | 18 | 64 | 28 | 108 | 2 | 8 |
| Netherlands | 29 | 113 | 38 | 156 | 1 | 4 |
| Germany | - | - | 12 | 38 | - | 0 |
| Italy | 67 | 248 | 5 | 20 | - | 0 |
| Canada | - | - | 0 | 5 | - | 0 |
| New Zealand | 19 | 64 | - | - | - | - |
| Denmark | 6 | 23 | - | - | - | - |
| Total | 393 | 1 365 | 840 | 2 227 | 1 566 | 3 159 |

Source: Japanese Ministry of Finance.

Table 98 Japanese exports of frozen shark fillets by country of destination

| Country | 1995 | | 1996 | | 1997 | |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Tonnes | US\$ 1 000 | Tonnes | US\$ 1 000 | Tonnes | US\$ 1 000 |
| Singapore | 770 | 2 878 | 183 | 772 | 696 | 3 160 |
| Korea Rep | 39 | 104 | 57 | 207 | 299 | 911 |
| Mauritius | 42 | 146 | 28 | 115 | 225 | 953 |
| Germany | 44 | 189 | 296 | 1 265 | 110 | 483 |
| Italy | 124 | 509 | 301 | 1 293 | 110 | 492 |
| Hong Kong | - | - | - | - | 93 | 105 |
| China | - | - | - | - | 72 | 52 |
| Netherlands | 125 | 525 | 270 | 1 156 | 22 | 93 |
| Slovenia | 19 | 84 | 104 | 402 | 20 | 84 |
| Spain | - | - | - | - | 9 | 18 |
| South Africa | 22 | 38 | 27 | 42 | 6 | 11 |
| France | 9 | 32 | 66 | 268 | - | 0 |
| Belgium | - | - | 44 | 205 | - | 0 |
| Brazil | - | - | 12 | 13 | - | 0 |
| USA | 24 | 86 | - | - | - | - |
| Denmark | 16 | 62 | - | - | - | - |
| Sweden | 2 | 10 | - | - | - | - |
| Total | 1 205 | 4 663 | 1 387 | 5 738 | 1 662 | 6 363 |

Source: Japanese Ministry of Finance

**Table 99 Japanese exports of shark fins dried but not smoked,
by country of destination in kilograms**

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Hong Kong | 421 600 | 388 060 | 368 560 | 314 750 | 283 750 | 309 590 | 321 354 | 280 714 | 285 864 |
| China | 3 300 | 10 140 | 4 280 | 13 560 | 420 | 180 | 10 514 | 23 421 | 42 586 |
| Indonesia | - | - | - | - | - | - | - | 7 500 | 21 020 |
| Singapore | 67 370 | 49 700 | 62 980 | 83 760 | 57 770 | 79 550 | 41 990 | 34 735 | 17 836 |
| Australia | - | - | - | - | - | - | 95 | - | 1 200 |
| Guam | 20 | 40 | 110 | 1 300 | 850 | 970 | 906 | 629 | 544 |
| Canada | - | - | - | - | 40 | 200 | 222 | - | 210 |
| N. Marianas | - | - | - | 130 | 110 | 110 | 127 | 112 | 30 |
| Turkey | - | - | - | 10 | - | - | - | 12 | 12 |
| Thailand | 9 680 | 950 | 3 640 | 15 310 | 13 210 | 8 450 | 2 552 | 1 300 | - |
| Taiwan PC | 300 | 1 000 | - | 5 440 | 3 900 | - | 2 730 | - | - |
| USA | 350 | 540 | 140 | 320 | 340 | - | - | - | - |
| Spain | - | 60 | - | - | - | - | - | - | - |
| Switzerland | - | 20 | - | - | - | - | - | - | - |
| New Zealand | - | 750 | - | - | - | - | - | - | - |
| Korea Rep. | 410 | - | - | - | - | - | - | - | - |
| Total | 503 040 | 451 260 | 439 710 | 434 580 | 360 390 | 399 040 | 380 490 | 348 423 | 369 302 |

Source: Japanese Ministry of Finance.

**Table 100 Japanese exports of shark fins dried but not smoked,
by country of destination in US\$ 1 000**

| Country | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Hong Kong | 10 833 | 8 818 | 10 219 | 12 532 | 11 435 | 10 624 | 14 498 | 10 605 | 11 936 |
| Singapore | 1 457 | 1 092 | 1 675 | 3 300 | 2 057 | 2 852 | 1 655 | 1 134 | 615 |
| China | 34 | 136 | 46 | 94 | 4 | 8 | 232 | 263 | 609 |
| Indonesia | - | - | - | - | - | - | - | 74 | 192 |
| Guam | 2 | 6 | 15 | 256 | 49 | 42 | 63 | 68 | 69 |
| Australia | - | - | - | - | - | - | 15 | - | 33 |
| Canada | - | - | - | - | 2 | 11 | 14 | - | 14 |
| Turkey | - | - | - | 3 | - | - | - | 5 | 4 |
| N. Marianas | - | - | - | 7 | 9 | 7 | 10 | 10 | 4 |
| Thailand | 174 | 61 | 187 | 253 | 269 | 153 | 47 | 118 | - |
| Taiwan PC | 10 | 36 | - | 147 | 165 | - | 86 | - | - |
| Spain | - | 5 | - | - | - | - | - | - | - |
| Switzerland | - | 2 | - | - | - | - | - | - | - |
| USA | 55 | 84 | 23 | 63 | 50 | - | - | - | - |
| New Zealand | - | 5 | - | - | - | - | - | - | - |
| Korea Rep. | 10 | - | - | - | - | - | - | - | - |
| Total | 12 577 | 10 247 | 12 164 | 16 653 | 14 039 | 13 697 | 16 619 | 12 278 | 13 478 |

Source: Japanese Ministry of Finance.

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APPENDIXES

APPENDIX I

INTERNATIONAL PLAN OF ACTION FOR THE CONSERVATION AND MANAGEMENT OF SHARKS

Introduction

1. For centuries artisanal fishermen have conducted fishing for sharks sustainably in coastal waters, and some still do. However, during recent decades modern technology in combination with access to distant markets have caused an increase in effort and yield of shark catches, as well as an expansion of the areas fished.

2. There is concern over the increase of shark catches and the consequences which this has for the populations of some shark species in several areas of the world's oceans. This is because sharks often have a close stock-recruitment relationship, long recovery times in response to over-fishing (low biological productivity because of late sexual maturity; few off-spring, albeit with low natural mortality) and complex spatial structures (size/sex segregation and seasonal migration).

3. The current state of knowledge of sharks and the practices employed in shark fisheries cause problems in the conservation and management of sharks due to lack of available catch, effort, landings and trade data, as well as limited information on the biological parameters of many species and their identification. In order to improve knowledge on the state of shark stocks and facilitate the collection of the necessary information, adequate funds are required for research and management.

4. The prevailing view is that it is necessary to better manage directed shark catches and certain multispecies fisheries in which sharks constitute a significant bycatch. In some cases the need for management may be urgent.

5. A few countries have specific management plans for their shark catches and their plans include control of access, technical measures including strategies for reduction of shark bycatches and support for full use of sharks. However, given the wide-ranging distribution of sharks, including on the high seas, and the long migration of many species, it is increasingly important to have international cooperation and coordination of shark management plans. At the present time there are few international management mechanisms effectively addressing the capture of sharks.

6. The Inter-American Tropical Tuna Commission, the International Council for the Exploration of the Sea, the International Commission for the Conservation of Atlantic Tunas, the Northwest Atlantic Fisheries Organization, the Sub-regional Fisheries Commission of West African States, the Latin American Organization for Fishery Development, the Indian Ocean Tuna Commission, the Commission for the Conservation of Southern Bluefin Tuna and the Oceanic Fisheries Programme of the Pacific Community have initiated efforts encouraging member countries to collect information about sharks, and in some cases developed regional databases for the purpose of stock assessment.

7. Noting the increased concern about the expanding catches of sharks and their potential negative impacts on shark populations, a proposal was made at the Twenty-second Session of the FAO Committee on Fisheries (COFI) in March 1997 that FAO organize an expert consultation, using extra-budgetary funds, to develop Guidelines leading to a Plan of Action to be submitted at the next Session of the Committee aimed at improved conservation and management of sharks.

8. This International Plan of Action for Conservation and Management of Sharks (IPOA-SHARKS) has been developed through the meeting of the Technical Working Group on the Conservation and Management of Sharks in Tokyo from 23 to 27 April 1998¹ and the Consultation on Management of Fishing Capacity, Shark Fisheries and Incidental Catch of Seabirds in Longline Fisheries held in Rome from 26 to 30 October 1998 and its preparatory meeting held in Rome from 22 to 24 July 1998².

¹ See "Report of the FAO Technical Working Group on the Conservation and Management of Sharks", Tokyo, Japan, 23-27 April 1998. FAO Fisheries Report No. 583.

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

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

Nature and Scope

10. The IPOA-SHARKS is voluntary. It has been elaborated within the framework of the Code of Conduct for Responsible Fisheries as envisaged by Article 2 (d). The provisions of Article 3 of the Code of Conduct apply to the interpretation and application of this document and its relationship with other international instruments. All concerned States⁹ are encouraged to implement it.

11. For the purposes of this document, the term "shark" is taken to include all species of sharks, skates, rays and chimaeras (Class *Chondrichthyes*), and the term "shark catch" is taken to include directed, bycatch, commercial, recreational and other forms of taking sharks.

12. The IPOA-SHARKS encompasses both target and non-target catches.

Guiding principles

13. *Participation.* States that contribute to fishing mortality on a species or stock should participate in its management.

14. *Sustaining stocks.* Management and conservation strategies should aim to keep total fishing mortality for each stock within sustainable levels by applying the precautionary approach.

15. *Nutritional and socio-economic considerations.* Management and conservation objectives and strategies should recognize that in some low-income food-deficit regions and/or countries, shark catches are a traditional and important source of food, employment and/or income. Such catches should be managed on a sustainable basis to provide a continued source of food, employment and income to local communities.

Objective

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

Implementation

17. The IPOA-SHARKS applies to States in the waters of which sharks are caught by their own or foreign vessels and to States the vessels of which catch sharks on the high seas.

18. States should adopt a national plan of action for conservation and management of shark stocks (*Shark-plan*) if their vessels conduct directed fisheries for sharks or if their vessels regularly catch sharks in non-directed fisheries. Suggested contents of the *Shark-plan* are found in Appendix A. When developing a *Shark-plan*, experience of subregional and regional fisheries management organizations should be taken into account, as appropriate.

19. Each State is responsible for developing, implementing and monitoring its *Shark-plan*.

20. States should strive to have a *Shark-plan* by the COFI Session in 2001.

21. States should carry out a regular assessment of the status of shark stocks subject to fishing so as to determine if there is a need for development of a shark plan. This assessment should be guided by article 6.13 of the Code of Conduct for Responsible Fisheries. The assessment should be reported as a part of each relevant State's *Shark-plan*. Suggested contents of a shark assessment report are found in Appendix B. The assessment would necessitate consistent collection of data, including *inter alia* commercial data and data leading to improved species identification and, ultimately, the establishment of abundance indices. Data collected by States

⁹ In this document, the term "State" includes Members and non-members of FAO and applies *mutatis mutandis* also to "fishing entities" other than States.

should, where appropriate, be made available to, and discussed within the framework of, relevant subregional and regional fisheries organizations and FAO. International collaboration on data collection and data sharing systems for stock assessments is particularly important in relation to transboundary, straddling, highly migratory and high seas shark stocks.

22. The *Shark-plan* should aim to:

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

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

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

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

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

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

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

Role of FAO

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

30. FAO will, as and to the extent directed by its Conference, support development and implementation of *Shark-plans* through specific, in-country technical assistance projects with Regular Programme funds and by use of extra-budgetary funds made available to the Organization for this purpose. FAO will provide a list of experts and a mechanism of technical assistance to countries in connection with development of *Shark-plans*.

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

SUGGESTED CONTENTS OF A *SHARK-PLAN*

I. BACKGROUND

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

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

II. CONTENT OF THE *SHARK-PLAN*

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

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

The *Shark-plan* should contain:

A. Description of the prevailing state of :

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

B. The objective of the *Shark-plan*.

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

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

SUGGESTED CONTENTS OF A SHARK ASSESSMENT REPORT

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

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

APPENDIX II

COMMERCIALY IMPORTANT SHARK SPECIES BY COUNTRY

by SEI POH CHEN

This table does not indicate all species caught, landed or traded in the countries listed.

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT |
|-----------|---------------------------|---------------------------------|-------------------------|--|---|
| ARGENTINA | Topo shark | <i>Galeorhinus galeus</i> | max 195 f 195 m 175 | | meat-exports to Italy, Greece, Spain, Australia, Brazil (frozen) |
| | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | meat-eaten, highly appreciated | meat-exports to Japan, Republic of Korea & Australia |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | meat-eaten (fresh/dried salted) | fin-export |
| | Broadnose sevengill shark | <i>Notorynchus cepedianus</i> | max 290 f 288 m 226 | meat-eaten sport fishing | |
| | Copper shark | <i>Carcharhinus brachyurus</i> | max 292 f 292 m 266 | | |
| | Sand tiger shark | <i>Eugomphodus taurus</i> | max 318 f 300 m 257 | | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 337 m 240 | meat-eaten | |
| | Narrownose smooth-hound | <i>Mustelus schmitti</i> | max 74 f 60 m 48 | meat-eaten (fresh/dried/salted) | |
| | Dusky smooth-hound | <i>Mustelus conis</i> | max 150 f 122 m 82 | | |
| | Striped smooth-hound | <i>Mustelus fasciatus</i> | max 150 m 62 | meat-eaten (fresh/frozen/dried salted) | |
| AUSTRALIA | Tiger shark | <i>Galeocerdo cuvier</i> | max 550 f 550 m 370 | meat-eaten (fresh/frozen) [fish and chips trade] (fillets) | fin-exports to Singapore etc (dried) |
| | Topo shark | <i>Galeorhinus galeus</i> | max 195 f 195 m 175 | meat-eaten (fresh/frozen) [fish and chips trade] | fin-export |
| | Mako shark | <i>Isurus spp</i> | | meat-eaten (fresh/frozen) | fin-export catch-by Japanese vessels operating in Australian waters |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | meat-eaten (fresh/smoked) sport fishing | catch-by Japanese vessels operating in Australian waters |
| | Blacktip shark | <i>Carcharhinus limbatus</i> | max 255 f 255 m 226 | meat-eaten (fresh/frozen) | catch-by Taiwanese (Province of China) vessels operating in Australian waters |
| | Spot-tail shark | <i>Carcharhinus signatus</i> | max 160 f 150 m 128 | meat-eaten | catch-by Taiwanese (Province of China) vessels operating in Australian waters |
| | Gummy shark | <i>Mustelus antarcticus</i> | max 157 f 80 m 68 | | |
| | Longnose sawshark | <i>Pristiophorus cirratus</i> | max 137 | | |
| | Shortnose sawshark | <i>Pristiophorus nudipinnis</i> | max 122 | | |
| | Shortnose spurdog | <i>Squalus megalops</i> | max 71 f 71 m 42 | | meat-eaten (fresh) |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT |
|-----------------------------|-----------------------------|--------------------------------|-------------------------|--|---|
| AUSTRALIA (cont.) | Sharks, species unspecified | | | | meat-imports from New Zealand (frozen) meat-exports to Singapore, Malaysia, Hong Kong, Taiwan Province of China, Japan & UK fin-imports from Singapore (canned soup) fin-exports (dried) |
| BANGLADESH | Sharks, species unspecified | | | | fin-exports to Singapore (dried) |
| BELGIUM | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten [super markets, fish shops] (fresh backs*) | meat-imports from USA, Scotland & Norway; re-exports to other EU countries |
| | Catsharks | <i>Scyliorhinus</i> spp | | meat-eaten | |
| | Sharks, species unspecified | | | | fin-imports from Hong Kong (frozen), China (dried fin needles); Singapore (canned soup) |
| CANADA | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | meat-eaten | meat-exports to Europe |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | | |
| | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten (fresh/frozen) | meat-exports to USA (steak) |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 337 m 240 | | |
| | Dogfish & other sharks | | | | |
| CHINA (INCLUDING HONG KONG) | Spadenose shark | <i>Scoliodon laticaudus</i> | max 74 f 69 m 58 | meat-eaten (fresh/salted/canned/minced products) liver-eaten fin-eaten skin** - eaten | |
| | Scalloped hammerhead | <i>Sphyrna lewini</i> | max 420 f 309 m 295 | | |
| | Spot-tail shark | <i>Carcharhinus signatus</i> | max 160 f 150 m 128 | | |
| | Japanese tope shark | <i>Hemirhamphus japonicus</i> | max 130 f 120 m 110 | | |
| | Whitespotted bamboo shark | <i>Chiloscyllium plagiosum</i> | max 95 f 95 m 69 | | |
| | Spotless smooth-hound | <i>Mustelus griseus</i> | max 101 f 101 m 87 | | |
| | Sharks, species unspecified | | | | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT | |
|---------|-----------------------------|-----------------------------------|-------------------------|---|--|--|
| CUBA | Night shark | <i>Carcharhinus signatus</i> | max 280 f 179 | fishmeal | fin-export | |
| | Blacktip shark | <i>Carcharhinus limbatus</i> | max 225 f 255 m 226 | meat-eaten | | |
| | Great white shark | <i>Carcharodon carcharias</i> | max 640 m 550 | meat-eaten (fresh/dried salted/smoked) carcass-fishmeal | | |
| | Great hammerhead | <i>Sphyrna mokarran</i> | max 610+ f 549 m 341 | meat-eaten (salted/dried) | | |
| CYPRUS | Smooth-hound | <i>Mustelus</i> spp. | | meat-eaten | | |
| | Catsharks | <i>Scyliorhinus</i> spp. | | | | |
| | Topo sharks | <i>Galeorhinus galeus</i> | max 195 f 162 m 145 | | | |
| | Bliss shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | | |
| | Sharks, species unspecified | | | | | meat-eaten |
| FIJI | Black-tip shark | <i>Carcharhinus limbatus</i> | max 255 f 255 m 226 | meat-eaten when not taboo | fin-exports to Hong Kong etc (dried & some frozen) | |
| | Grey reef shark | <i>Carcharhinus amblyrhynchus</i> | max 255 f 137 m 145 | | | |
| | Whitetip reef shark | <i>Triaenodon obesus</i> | m 213 f 158 m 168 | | | |
| | Lemon shark | <i>Negaprion brevirostris</i> | max 340 f 285 m 279 | | | |
| | Tiger shark | <i>Galeocerdo cuvier</i> | max 550 f 550 m 370 | | | |
| | Bull shark | <i>Carcharhinus leucas</i> | max 340 f 324 m 299 | | | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | | |
| | Mako sharks | <i>Isurus</i> spp. | | | | |
| | Dogfish & other sharks | | | | | fin-exports to Japan |
| FRANCE | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten [super/hypermarkets] (fresh) | meat-imports from UK, Ireland, Norway, Netherlands, USA, Denmark (fresh/frozen backs*, whole skinless) re-exports to Italy (fresh/ chilled) and Spain | |
| | Smallspotted catshark | <i>Scyliorhinus canicula</i> | max 100 f 60 m 60 | meat-eaten [hypermarket, fish shops] (fresh whole/skinless) | meat-eaten | |
| | Starry nursehound | <i>Scyliorhinus stellaris</i> | max 162 f 125 m 125 | | | |
| | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | | | |
| | Topo shark | <i>Galeorhinus galeus</i> | Max 195 f 195 m 175 | meat-eaten [homes, schools, hospitals, super/hypermarkets, restaurants, caterers] | meat-exported to Italy | |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | | | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | meat-eaten [hypermarket] | | meat-imports from Ireland and UK. |
| | Sharks, species unspecified | | | | | fin-imports from Singapore (dried fin needles/canned soup), Suriname (dried fin needles) |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT |
|-----------|-----------------------------|---------------------------------|-------------------------|--|--|
| GERMANY | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten (smoked belly flaps, fresh/smoked backs*) fin-eaten [Asian restaurants] | meat-imports from Denmark & Norway (smoked), re-exports to Italy and Belgium fin-exports to Far East |
| | Smallspotted catshark | <i>Scyliorhinus reticulatus</i> | max 100 f 60 m 60 | meat-eaten | meat-imports from Denmark & Norway |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | meat-eaten (fresh/frozen steaks) | meat-imports (frozen steaks), process and re-exports to other EU countries |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 337 m 240 | meat-eaten (frozen steaks) fin-eaten [Asian restaurants] | meat-imports from Japan (frozen steaks), processes and re-exports to Italy & other EU countries fin-exports to Far East |
| | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | meat-eaten | meat-imports (frozen) |
| | Nursehound | <i>Scyliorhinus stellaris</i> | max 162 | | |
| | Blow shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | |
| | Angel shark | <i>Squatina squatina</i> | max 183 f 146 | | |
| | Sharks, species unspecified | | | fishmed | meat-imports from Japan, Surinam (frozen), exports to Italy & other EU countries fin-imports from Far East (dried fin needles), Singapore (canned soup) |
| GREECE | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten [fish markets, supermarkets & fish taverns] (fresh/frozen steaks/filets) | meat-imports from Oman |
| | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | | meat-imports from West Africa, South Africa, USA and Arabic countries (frozen steak) |
| | Sharks, species unspecified | | | | meat-imports from Brazil, Argentina & Oman fin-imports from China via other EU country (dried) |
| INDIA | Whale shark | <i>Rhinodon typus</i> | max 1210 | meat-eaten (fresh and limited quantity salted) | fin-exports the bulk to Singapore and Hong Kong, lesser quantities to other Asian countries and Europe (dried) |
| | Oceanic whitetip shark | <i>Carcharhinus longimanus</i> | max 395 f 225 m 210 | | |
| | Tiger shark | <i>Galeocerdo cuvier</i> | max 550 f 550 m 370 | | |
| | Indian lemon shark | <i>Negaprion acutidens</i> | | | |
| | Milk shark | <i>Rhizoprionodon acutus</i> | max 178 f 178 m 165 | | |
| | Spadesea shark | <i>Scoliodon laticauda</i> | max 74 f 69 m 58 | | |
| | Smooth hammerhead | <i>Sphyrna zygaena</i> | max 400 f 304 m 256 | | |
| | Blacktip shark | <i>Carcharhinus limbatus</i> | max 225 f 184 m 195 | | |
| | Scalloped hammerhead | <i>Sphyrna lewini</i> | max 420 f 309 m 295 | | |
| INDONESIA | Shovelnose ray | <i>Rhinobatos bonasus</i> | | meat-eaten but not appreciated | fin-exports to Singapore, Hong Kong, Malaysia (dried) |
| | White-spotted guitarfish | <i>Rhynchobatus djiddensis</i> | max 300 m 110 | | |
| | Requiem sharks | <i>Carcharhinus</i> spp. | | | |
| | Hammerhead sharks | <i>Sphyrna</i> spp. | | | |
| | Spot-tail shark | <i>Carcharhinus sorrah</i> | max 160 f 150 m 128 | | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT |
|----------------------|-----------------------------|--------------------------------|-------------------------|--|---|
| INDONESIA (cont.) | Tiger shark | <i>Galeocerdo cuvier</i> | max 550 f 550 m 430 | meat-eaten but not appreciated | fin-exports to Singapore, Hong Kong, Malaysia (dried) |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | |
| | Sharks, unspecified species | | | | |
| IRELAND | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten (restaurants/fish and chips trade) | meat-exports to UK, France, Belgium and Netherlands |
| | Smallspotted catshark | <i>Scyliorhinus canicula</i> | max 100 f 60 m 60 | | |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | meat-eaten, highly appreciated | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 337 m 240 | | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | sport fishing | meat-exports to Spain |
| | Sharks, species unspecified | | | | fin-imports from Singapore (canned soup) |
| ITALY | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | meat-eaten, highly appreciated | meat-imports (frozen) |
| | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | | |
| | Catsharks | <i>Scyliorhinus</i> spp. | | meat-eaten | meat-imports (frozen) |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | | |
| | Thresher shark | <i>Alopias</i> spp. | max 549 f 462 m 359 | | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | |
| | Basking shark | <i>Cetorhinus maximus</i> | max 980 f 980 m 900 | | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 337 m 240 | | |
| | Smooth hammerhead | <i>Sphyrna zygaena</i> | max 400 f 304 m 256 | | |
| | Sharks, species unspecified | | | | |
| JAPAN | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | meat-minced fish products skin-eaten (nikogori) | fin-exports to Hong Kong and Singapore etc (dried) |
| | Longfin mako shark | <i>Isurus paucus</i> | max 417 f 417 m 245 | | |
| | Thresher shark | <i>Alopias vulpinus</i> | max 549 f 549 m 420 | | |
| | Salmon shark | <i>Lamna ditropis</i> | max 305 f 305 m 240 | heart-eaten (sashimi) | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 394 m 284 | meat-eaten (sashimi) | |
| | Spotted smooth-hound | <i>Mustelus manaso</i> | max 117 f 91 m 81 | | |
| | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | | |
| | Japanese tope shark | <i>Hemibranchius japonicus</i> | max 120 f 120 m 110 | meat-eaten | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT | |
|-------------------|-----------------------------|--------------------------------------|---------------------|--------------------------------------|--|--|
| JAPAN (cont.) | Sharks, species unspecified | | | | meat-imports from Taiwan Province of China, Republic of Korea, Canada, USA & China meat-exports to Italy, Belgium, Germany, Brazil & Peru (frozen shark); EU & USA (frozen fillets) | |
| KENYA | Sharks, species unspecified | | | meat-eaten | fin-exports to Hong Kong (dried) | |
| REPUBLIC OF KOREA | Dogfish | | | meat-eaten | meat-imports from New Zealand (frozen) | |
| | Sharks, species unspecified | | | | meat-imports from Singapore, Indonesia, Malaysia, Hong Kong, Panama, Chile & India meat-exports to Japan, Spain, USA, Côte d'Ivoire, United Arab Emirates (frozen) | |
| MALAYSIA | White-spotted guitarfish | <i>Rhynchobatus djiddensis</i> | max 300 m 110 | meat-eaten fin-eaten | | |
| | Milk shark | <i>Scoriodon noronkowi</i> | max 178 f 165 m 178 | skin**-extra cartilage(fin)-extra | | |
| | Slender bamboo shark | <i>Chiloscyllium indicum</i> | max 65 | (soup base) | | |
| | Hammerhead sharks | <i>Sphyrna</i> spp. | | fin-eaten | | |
| | Shovelnose ray | <i>Rhinobatos blochii</i> | | fin-eaten highly appreciated | | |
| | Sharks, species unspecified | | | | | meat-imports from Taiwan Province of China, Australia, Norway, USA, Hong Kong & New Zealand (frozen) meat-exports to Japan, UK, Taiwan Province of China, Singapore (frozen) fin-imports from Indonesia, Singapore (dried) fin-exports to Hong Kong (dried) |
| MALDIVES | Silky shark | <i>Carcharhinus falciformis</i> | max 330 f 305 m 300 | meat-eaten | fin-exports to Asia (dried) | |
| | Oceanic whitetip shark | <i>Carcharhinus longimanus</i> | max 395 f 225 m 210 | | | |
| | Tiger shark | <i>Galeocerdo cuvier</i> | max 550 f 550 m 370 | | | |
| | Scalloped hammerhead | <i>Sphyrna lewini</i> | max 420 f 309 m 295 | | | |
| | Zebra shark | <i>Stegostoma fasciatum</i> | max 354 f 233 m 183 | | | meat-eaten (fresh/dried salted) |
| | Grey reef shark | <i>Carcharhinus amblyrhynchoides</i> | max 255 f 137 m 145 | | | meat-eaten |
| | Smalltooth sand tiger | <i>Odontaspis ferox</i> | max 360 f 360 m 275 | | | |
| | Grey bamboo shark | <i>Chiloscyllium griseum</i> | max 74 | | | |
| | Pigeye shark | <i>Carcharhinus amblopinatus</i> | max 280 f 223 m 195 | meat-eaten (fresh) | | |
| | Blacktip reef shark | <i>Carcharhinus melanopterus</i> | max 180 f 113 m 135 | meat-eaten (fresh/dried salted) | | |
| | Spot-tail shark | <i>Carcharhinus sorrah</i> | max 160 f 150 m 128 | | | |
| | Sharks, species unspecified | | | | meat-exports to Comoros (dried) | |

| COI NTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT |
|--------------------------|-----------------------------------|---------------------------------|--|--|-----------------------|
| MEXICO | Silky shark | <i>Carcharhinus falciformis</i> | max 330 f 305 m 300 | meat-eaten | fin-export |
| | Bull shark | <i>Carcharhinus leucas</i> | max 340 f 324 m 299 | | |
| | Deaky shark | <i>Carcharhinus obscurus</i> | max 400 f 365 m 340 | | |
| | Blacktip shark | <i>Carcharhinus limbatus</i> | max 255 f 255 m 226 | | |
| | Sandbar shark | <i>Carcharhinus obscurus</i> | max 400 f 365 m 340 | | |
| | Tiger shark | <i>Galeoceris cuvier</i> | max 550 f 550 m 370 | | |
| | Lemon shark | <i>Negaprion brevirostris</i> | max 340 f 285 m 279 | | |
| | Great hammerhead | <i>Sphyrna mokarran</i> | max 610+ f 549 m 341 | | |
| | Bull shark | <i>Carcharhinus leucas</i> | max 340 f 324 m 299 | | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | |
| | Oceanic whitetip shark | <i>Carcharhinus longimanus</i> | max 395 f 270 m 245 | meat-eaten (fresh/smoked) | |
| | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | meat-eaten (fresh/dried salted) | |
| | Scalloped hammerhead | <i>Sphyrna lewini</i> | max 420 f 309 m 295 | meat-eaten (fresh/smoked/dried salted) | |
| | Bigeye thresher shark | <i>Alopias superciliosus</i> | max 461 f 355 m 430 | meat-eaten (fresh/smoked/dried) | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 394 m 284 | meat-eaten (fresh/frozen headed/gutted) | meat-exports |
| | Thresher shark | <i>Alopias vulpinus</i> | max 609 f 549 m 420 | | |
| | Longfin mako shark | <i>Isurus paucus</i> | max 417 f 417 m 245 | meat-eaten (fresh/frozen headed/gutted) | meat-exports |
| Atlantic sharpnose shark | <i>Rhizoprionodon terraenovae</i> | max 110 f 110 m 103 | | | |
| Bonnethead shark | <i>Sphyrna tiburo</i> | max 150 f 130 m 124 | meat-eaten (dried/salted) | meat-exports | |
| Caribbean reef shark | <i>Carcharhinus perezi</i> | max 295 | | | |
| Blacknose shark | <i>Carcharhinus acronotus</i> | max 200 f 137 m 106 | meat-eaten, traditionally not preferred sport fishing | fin-exports to Singapore etc | |
| Snaggletooth shark | <i>Hemipristis elongata</i> | max 240 f 218 m 145 | | | |
| Spinner shark | <i>Carcharhinus brevipinna</i> | max 278 f 278 m 233 | | | |
| Great hammerhead | <i>Sphyrna mokarran</i> | max 610+ f 549 m 341 | | | |
| Sandbar shark | <i>Carcharhinus limbatus</i> | max 239 f 234 m 224 | meat-eaten | meat-imports from USA, Denmark, UK (frozen), re-exports to Germany, Belgium, France & other EU countries (backs*, belly flaps) | |
| Piked dogfish | <i>Squalus aculeatus</i> | max 160 f 124 m 100 | | | |
| Catsharks | <i>Scyliorhinus</i> spp. | | | | meat-imports (frozen) |
| NETHERLANDS | Small spotted catshark | <i>Squalus ferminius</i> | | meat-eaten fin-eaten | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT | |
|---------------------|------------------------------|-----------------------------------|-------------------------|---|---|---|
| NETHERLANDS (cont.) | Mako shark | <i>Isurus</i> spp. | | meat-eaten | meat-imports from Oman (headless), Japan, Taiwan Province of China & South America (headless, finless), re-exported to Spain, France and UK | |
| | Blacktip reef shark | <i>Carcharhinus melanopterus</i> | max 180 f 113 m 135 | | meat-imports from Oman (headless) processed into frozen steak for re-export to Germany & UK | |
| | Requiem shark | <i>Carcharhinus</i> spp. | | | meat-imports from Surinam (frozen steak) | |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | | meat-exports to Belgium, France & Italy | |
| | Thresher shark | <i>Alopias vulpinus</i> | max 609 f 549 m 420 | fin-as display in fish shops | | |
| | Sharks, species unspecified | | | | meat-eaten (smoked bellies) | meat-imports from Japan, South Africa, re-exports to Italy, Germany (frozen) fin-imports from Indonesia, Surinam (dried fin needles); imports from Singapore (canned soup) |
| NEW ZEALAND | School shark | <i>Galeorhinus australis</i> | | meat-eaten [fish and chips trade] | meat-exports to Australia | |
| | Piked dogfish | <i>Squalus acanthias</i> | | meat-eaten [fish and chips trade] | meat-exports to Republic of Korea fin-exports to Hong Kong & Singapore | |
| | Spotted estuary smooth-hound | <i>Mustelus lenticalatus</i> | max 137 f 137 m 115 | | meat-exports to Australia | |
| | Ghost shark | <i>Mitsukurina owstoni</i> | max 335 m 322 | | meat-exports to Japan & Republic of Korea fin-exports to Hong Kong | |
| | Elephant fish | <i>Callorhynchus milii</i> | max 120 m 65 | | fin-exports to Hong Kong | |
| | Sharks, species unspecified | | | | meat-eaten | |
| NORWAY | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten | meat-exports to EU countries (fresh/frozen backs* and belly flaps) fin-exports to Far East | |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | | fin-exports to Asia | |
| | Boaking shark | <i>Cetorhinus maximus</i> | max 980 f 980 m 900 | | meat-exports to Eastern Europe fin-exports to Asia | |
| PAKISTAN | Sharks, species unspecified | | | | fin-exports to Singapore and other Asian countries (dried) | |
| PHILIPPINES | Whale shark | <i>Rhincodon typus</i> | max 1200 | meat-eaten (steaks, fresh, dried, salted) stomach, intestines, heart-eaten fin-eaten (fresh/dried) | | |
| | Spiny dogfish | <i>Squalus acanthias</i> | | meat-fishmeal, fertilizers | | |
| | Thresher shark | <i>Alopias vulpinus</i> | max 609 f 549 m 420 | | meat-eaten | fin-exports |
| | Grey reef shark | <i>Carcharhinus amblyrhynchus</i> | max 255 f 137 m 145 | | | |
| | Tiger shark | <i>Galeocerdo cuvier</i> | max 550 f 550 m 370 | | | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 394 m 284 | | | |
| | Great hammerhead | <i>Sphyrna mokarran</i> | max 610 f 549 m 341 | | | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT | |
|-----------------------------|-----------------------------|----------------------------------|-------------------------|--|--|-----------------------------|
| PHILIPPINES (cont.) | Blacktip reef shark | <i>Carcharhinus melanopterus</i> | max 180 f 113 m 135 | meat-eaten | fin-exports | |
| | Hammerhead sharks | <i>Sphyrna</i> spp. | | | fin-exports to Hong Kong, Singapore (dried) | |
| | Sharks, species unspecified | | | | | |
| SEYCHELLES | Shovelnose ray | <i>Rhinobatos blochii</i> | max 320 f 290 m 250 | meat-eaten | fin-exports to Asia | |
| | Sand tiger shark | <i>Eusomphodus taurus</i> | max 318 f 300 m 257 | | | |
| | Spinner shark | <i>Carcharhinus brevipinna</i> | max 278 f 278 m 233 | meat-eaten (fresh/dried salted) | | |
| | Sandbar shark | <i>Carcharhinus plumbeus</i> | max 239 f 234 m 224 | | | |
| | Great hammerhead | <i>Sphyrna mokarran</i> | max 610+ f 549 m 341 | | | |
| | Smooth hammerhead | <i>Sphyrna zygaena</i> | max 400 f 304 m 256 | | | |
| | Shovelnose ray | <i>Rhinobatos blochii</i> | max 320 F 290 m 250 | | | |
| | Copper shark | <i>Carcharhinus brachyurus</i> | max 292 f 292 m 266 | meat-eaten | | |
| | Shitaya shark | <i>Laxodon macrorhinus</i> | max 91 f 91 m 85 | meat-eaten (fresh) | | |
| | Whitetip reef shark | <i>Triaenodon obesus</i> | max 213 f 158 m 168 | | | |
| | Oceanic whitetip shark | <i>Carcharhinus longimanus</i> | max 395 f 270 m 245 | meat-eaten (fresh/dried salted) | | |
| | Sharks, species unspecified | | | meat-eaten (dried/salted) | | meat-exports (dried/salted) |
| | SINGAPORE | Dogfish & other sharks | | | | meat-eaten |
| Sharks, species unspecified | | | | fin-eaten skin** - eaten | fin-imports from Hong Kong, India, Taiwan Province of China, Republic of Korea and over 40 other countries worldwide (dried). Hong Kong, New Zealand, Japan etc (fin needles, canned) fin-exports to Hong Kong, Malaysia etc (dried/canned) | |
| SOLOMON ISLANDS | Sharks, species unspecified | | | meat, skin, stomach-eaten (salted dried or salted smoked) gill-eaten (boiled) liver-eaten (salted) | fin-exports | |
| SOUTH AFRICA | Shortnose spurdog | <i>Squalus megalops</i> | max 71 f 71 m 42 | meat-eaten (fresh/frozen/dried/smoked) | | |
| | Topo shark | <i>Galeorhinus galeus</i> | max 195 f 195 m 175 | | meat-exports to Australia, Greece, Italy, Germany, Belgium, Hong Kong (frozen) | |
| | Smooth-bound | <i>MurIELus mustelus</i> | max 164 f 164 m 110 | | | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 394 m 284 | | | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT | | |
|------------------------|-----------------------------|--------------------------------|---------------------------------|--|---|--|--|
| SOUTH AFRICA (cont.) | Dusky shark | <i>Carcharhinus obscurus</i> | max 400 f 365 m 340 | sport fishing | | | |
| | Milk shark | <i>Rhizoprionodon acutus</i> | max 178 f 165 m 178 | | | | |
| | Dogfish & other sharks | | | | | meat-imports from Taiwan Province of China etc (frozen) meat-exports to Italy, Greece & Hong Kong etc (frozen) fin-imports from Taiwan Province of China & Japan etc (frozen) fin-exports to China, Japan, Singapore etc (frozen) | |
| SPAIN | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten appreciated (fresh/frozen steaks, filets) | meat-imports | | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 394 m 284 | meat-eaten highly appreciated | meat-imports from Africa, Central and South America, Asia etc fin-imports from Hong Kong and East Asian countries (dried fin needles); Singapore (canned soup) fin-exports to Hong Kong, Republic of Korea, Thailand, China, Japan, etc | | |
| | Thresher shark | <i>Alopias vulpinus</i> | max 609 f 549 m 420 | meat-eaten | fin-exports to Asia | | |
| | Bigeye thresher shark | <i>Alopias superciliosus</i> | max 461 f 430 m 400 | | | | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | | | |
| | Basking shark | <i>Cetorhinus maximus</i> | max 980 f 980 m 900 | | | | |
| | Catsharks | <i>Scyliorhinus</i> spp. | | | | meat-imports from Portugal (frozen) | |
| | Tope shark | <i>Galeorhinus galeus</i> | max 195 f 195 m 175 | | | meat-eaten | |
| | Smooth hammerhead | <i>Sphyrna zygaena</i> | max 400 f 304 m 256 | | | | |
| | Scalloped hammerhead | <i>Sphyrna lewini</i> | max 420 f 309 m 295 | | | | |
| | Oval hammerhead | <i>Sphyrna mokarran</i> | max 610 f 549 m 341 | | | | |
| | Smallspotted catshark | <i>Scyliorhinus canicula</i> | max 100 f 60 m 60 | | | | |
| | Gulper shark | <i>Centrophorus granulosus</i> | max 150 | | | | |
| | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | | | | |
| | Blackmouth catshark | <i>Galeus melastomus</i> | max 90 f 90 m 61 | | | | |
| | Kitefin shark | <i>Dalatis licha</i> | max 182 f 159 m 121 | | | | |
| | Kaibikoth dogfish | <i>Symnodon ringens</i> | max 110 | | | | |
| | Sharks, species unspecified | | | | | offal, viscera-fishmeal | meat-imports from Africa, Central and South America and Asia (frozen) meat-exports to Italy |
| | SRI LANKA | Silky shark | <i>Carcharhinus falciformis</i> | | | max 330 f 305 m 300 | meat-eaten (fresh/dried salted) |
| Oceanic whitetip shark | | <i>Carcharhinus longimanus</i> | max 395 f 270 m 245 | | | | |
| Scalloped hammerhead | | <i>Sphyrna lewini</i> | max 420 f 309 m 295 | | | meat-eaten (fresh/dried salted) | |
| Thresher shark | | <i>Alopias vulpinus</i> | max 609 f 549 m 420 | | | | |
| Shortfin mako shark | | <i>Isurus paucus</i> | max 394 f 394 m 284 | | | | |
| Spottail shark | | <i>Carcharhinus sorrah</i> | max 160 f 150 m 128 | meat-eaten | | | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT |
|--------------------------|-----------------------------|-----------------------------------|------------------------|---|--|
| TAIWAN PROVINCE OF CHINA | Einkubuku | <i>Urolophus japonicus</i> | | | |
| | Starpolled smooth-hound | <i>Mustelus manazo</i> | max 117 f 91 m 81 | | |
| | Sicklefin weasel shark | <i>Negaprion microstoma</i> | max 91 f 85 m 91 | | |
| | Milk shark | <i>Rhizoprionodon aetus</i> | max 178 f 165 m 178 | meat-eaten (fresh, minced fish products) fin-eaten skin**-eaten | |
| | Scalloped hammerhead | <i>Sphyrna lewini</i> | max 420 f 309 m 295 | | |
| | Dusky shark | <i>Carcharhinus obscurus</i> | max 400 f 365 m 340 | | |
| | Whale shark | <i>Rhincodon typus</i> | max 1200 | | |
| | Thresher shark | <i>Alopias</i> spp. | max 549 f 462 m 359 | | |
| | Black-tip reef shark | <i>Carcharhinus melanopterus</i> | max 200 f 131 m 180 | meat-eaten highly appreciated (belly meat) | |
| | Sharks, species unspecified | | | | meat-imports from Hong Kong, Singapore, India, Philippines & Greenland (fresh/chilled or frozen) meat-exports to USA, Japan, Germany, Singapore, Republic of Korea & South Africa (fresh/chilled or frozen) fin-imports (fresh/chilled/frozen/dried) fin-exports (fresh/chilled/frozen or prepared) |
| TANZANIA | Silky shark | <i>Carcharhinus falciformis</i> | max 330 f 305 m 300 | | |
| | Sandbar shark | <i>Carcharhinus plumbeus</i> | max 239 f 234 m 224 | | fin-export |
| | Orcal hammerhead | <i>Sphyrna mokarran</i> | max 610 f 549 m 341 | meat-eaten (fresh/dried salted) | |
| | Hardnose shark | <i>Carcharhinus macrotis</i> | max 100 f 89 m 81 | | |
| | Blackfin reef shark | <i>Carcharhinus wheeleri</i> | max 193 f 193 m 172 | | |
| | Blackspot shark | <i>Carcharhinus sealii</i> | max 95 f 94 m 95 | meat-eaten sport fishing | |
| THAILAND | Grey bamboo shark | <i>Chirocentrus griseus</i> | max 74 | | |
| | Kidghead catshark | <i>Chirocentrus indicus</i> | max 65 | | |
| | Blacklip shark | <i>Carcharhinus limbatus</i> | max 255 f 255 m 226 | | |
| | Grey Reef shark | <i>Carcharhinus amblyrhynchus</i> | max 255 f 137 m 145 | | |
| | Zebra shark | <i>Megastoma fasciatum</i> | max 354 f 233 m 183 | | |
| | White-spotted guitarfish | <i>Rhynchobatus djiddensis</i> | max 300 m 110 | meat-eaten fin-eaten | |
| | Dogfish and other sharks | | | | meat-imports from Canada, Denmark, USA (frozen) meat-exports to China, Singapore (frozen) |
| | Sharks, species unspecified | | | | fin-imports from over 10 countries worldwide (dried) fin-exports to Singapore, Hong Kong, Japan (dried) |
| TURKEY | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | | |
| | Starry smooth-hound | <i>Mustelus asterias</i> | max 140 f 85 m 81 | meat-eaten but not appreciated | fin-exports to Asian countries (dried) |
| | Piked dogfish | <i>Squalus acanthias</i> | max 150 f 124 m 100 | | |
| | Nursehound | <i>Scyliorhinus stellaris</i> | max 162 | | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT |
|----------------|-----------------------------|-----------------------------------|-------------------------|--|---|
| TURKEY (cont.) | Longnose spurdog | <i>Squalus biainvittet</i> | max 95 f 60 m 50 | meat-eaten but not appreciated | fin-exports to Asian countries (dried) |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | |
| | Thresher shark | <i>Alopias vulpinus</i> | max 609 f 549 m 420 | | |
| | Basking shark | <i>Cetorhinus maximus</i> | max 980 f 980 m 900 | | |
| UK | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten [fish & chips trade] | meat-imports from USA & Canada, exports to France, Germany, Belgium, Italy etc. belly flap-exports to Germany fin-exports to Far East |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | meat-eaten | meat-exports to France, Spain and other EU countries |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | meat-exports to France |
| | Smallspotted catshark | <i>Scyliorhinus reticulatus</i> | max 100 f 60 m 60 | as bait in pot fisheries for crustaceans & molluscs | |
| | Basking shark | <i>Cetorhinus maximus</i> | max 980 f 980 m 900 | meat-eaten | |
| | Sharks, species unspecified | | | | fin-imports (dried whole/fin needles, canned soup) |
| URUGUAY | Tope shark | <i>Catrorhinus galus</i> | max 195 f 195 m 175 | meat-eaten (salted) | meat-exports to Brazil, Spain, Germany, USA, Netherlands & Israel (fresh/frozen as whole gutted or headed & gutted carcasses & filets) fin-export |
| | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten | |
| | Hammerhead sharks | <i>Sphyrna spp.</i> | | | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | |
| | Broadnose sevengill shark | <i>Notorynchus cepedianus</i> | max 290 f 288 m 226 | meat-eaten (frozen) | |
| | Sand tiger shark | <i>Etmopterus tauurus</i> | max 318 f 300 m 257 | meat-eaten (fresh/frozen/smoked) | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 394 m 284 | meat-eaten | |
| | Smooth-hound | <i>Mustelus mustelus</i> | max 164 f 164 m 110 | meat-eaten (fresh/frozen) carcass-fishmeal | |
| USA | Piked dogfish | <i>Squalus acanthias</i> | max 160 f 124 m 100 | meat-eaten (filets & steaks) [restaurants] | meat-imports from Canada, re-exports after processing |
| | Blacktip shark | <i>Carcharhinus limbatus</i> | max 255 f 255 m 226 | meat-eaten (frozen filets/medallions) [supermarkets] | fin-exports |
| | Sandbar shark | <i>Carcharhinus plumbeus</i> | max 239 f 234 m 224 | | |
| | Bull shark | <i>Carcharhinus leucas</i> | max 340 f 324 m 299 | | |
| | Spinner shark | <i>Carcharhinus brevipinna</i> | max 278 f 278 m 233 | meat-eaten | |
| | Silky shark | <i>Carcharhinus falciformis</i> | max 330 f 305 m 300 | | |
| | Lemon shark | <i>Negaprion brevirostris</i> | max 340 f 285 m 279 | meat-eaten (fresh/smoked) | |
| | Blue shark | <i>Prionace glauca</i> | max 383 f 323 m 311 | | |
| | Salmoe shark | <i>Lamna ditropis</i> | max 305 f 305 m 240 | meat-eaten | |
| | Broadnose sevengill shark | <i>Notorynchus cepedianus</i> | max 290 f 288 m 226 | | |
| | Oceanic whitetip shark | <i>Carcharhinus longimanus</i> | max 395 f 270 m 245 | meat-eaten (restaurants) | meat-imports from Chile, Ecuador, Mexico, Panama, Peru, Surinam, Uruguay, Canada, Portugal, Japan, Philippines and Taiwan Province of China |
| | Thresher shark | <i>Alopias vulpinus</i> | max 609 f 549 m 420 | | |
| | Shortfin mako shark | <i>Isurus paucus</i> | max 394 f 394 m 284 | meat-eaten (fresh/frozen/smoked) | |
| | Porbeagle | <i>Lamna nasus</i> | max 300+ f 219 m 262 | | |
| | Sand tiger shark | <i>Etmopterus tauurus</i> | max 318 f 300 m 257 | meat-eaten | |
| | Alliatic sharpnose shark | <i>Rhizoprionodon terraenovae</i> | max 110 f 110 m 103 | | |

| COUNTRY | ENGLISH NAME | SCIENTIFIC NAME | SIZE (cm) | DOMESTIC USE | IMPORT/EXPORT |
|-------------|---------------------|--------------------------------|------------------------|--|---------------|
| USA (cont.) | Tiger shark | <i>Galeocerdo cuvier</i> | max 550 f 550 m 370 | meat-eaten | |
| | Hornhead shark | <i>Sphyrna tiburo</i> | max 150 f 130 m 124 | | |
| | Blacknose shark | <i>Carcharhinus acronotus</i> | max 200 f 137 m 106 | | |
| | Copper shark | <i>Carcharhinus brachyurus</i> | max 292 f 292 m 266 | | |
| | Leopard shark | <i>Triakis semifasciata</i> | max 180 f 180 m 150 | | |
| | Finetooth shark | <i>Carcharhinus isodon</i> | max 189 f 165 m 158 | meat-eaten (fresh) | |
| | Longfin mako shark | <i>Isurus paucus</i> | max 417 f 417 m 245 | meat-eaten (fresh/frozen) | |
| | Pacific angel shark | <i>Squatina californica</i> | max 152 f 108 m 114 | | |
| | Tope shark | <i>Galeorhinus galeus</i> | max 195 f 195 m 175 | | |
| | Smalltail shark | <i>Carcharhinus porosus</i> | max 150 f 134 m 117 | meat-eaten (fresh/frozen) carcass-fishmeal | |

*Backs: headed, gutted, and skinless with belly flaps removed.

**Skin: taken from the upper part of the tail fin, traded as food with the glomerised name of fish lips. In Taiwan Province of China, skin from the body is also eaten.

Source: Expanded from Krescer & Ahmed 1978 and updated using various sources

APPENDIX III
NON-FOOD USES OF SHARKS
by HOOI KOK KUANG

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1 INTRODUCTION

The writer's contract was to update information on the FAO publication entitled *Shark Utilization and Marketing* by Kreuzer & Ahmed (1978), concentrating on the uses of shark hides, liver oil and teeth, in particular on products which are not used as human food. The report would include pharmaceutical products produced from sharks, but would not reproduce material found in the above-mentioned FAO report.

Over the past 20 years, the recording of catches of sharks has improved only slightly so there is still a great deal of uncertainty about this fishery. The uses to which sharks have been put have changed, and the claims about their health benefits have increased. However, our understanding of these health claims has yet to be fully described.

2 SHARK LIVER OIL PRODUCTS

Kreuzer & Ahmed (1978) reported that the development of synthetic vitamins (particularly vitamin A) led to the virtual collapse of the markets for shark liver oil; it relieved temporarily the fishing pressure on sharks. Shark liver oils have also been used in the textile and tanning industries, as lubricants, in cosmetics and skin healing products, in health products and in traditional foods.

Over the past 20 years, the processing methods for shark liver oils have not changed very much, but quality control techniques have improved the product (Wong, 1998, pers comm) in tandem with related developments, such as refrigeration at sea. However, Summers, Wong & Eyres (undated) also suggested that livers can be ensilaged and stored at ambient temperature instead of more costly refrigeration at sea. They argued that ensilaging would not only prevent protein putrefaction and retard oxidation but also aid in the release and recovery of the oil. They considered this was most suited for fisheries located in remote areas. In one of their experiments they found that the highest amount of oil was extracted from samples of liver treated with formic and phosphoric acids and a permitted (food) antioxidant, and the least amount was extracted from a sample left to deteriorate. Rose (1996) observed that in the Maldives, which may possibly be considered as a remote area, the livers are simply left in the sun for hours or days before they are boiled and the oil extracted.

Shark livers have been used traditionally as foods. This ranged from being eaten fresh after its harvesting and cooking, to being preserved by salting and, much later, cooked before eating.

Other uses included the use of crude liver oils to coat the hulls of wooden boats as a preservative against marine fouling, and as fuel for street lamps. Crude liver oils containing squalene were used as lubricants since its melting point is -75°C and its boiling point is 330°C .

There are variations in detail, but the description by Tanikawa (1985) probably covers most of the principles involved in processing the liver for the crude oil. The livers or blubber are chopped or minced before cooking in steam or water. The mixture of oil and water is allowed to cool and settle. The residue may be used in fishmeal production (as in India), or as feed for pigs and poultry. The crude oil is then sent to separating tanks and may be centrifuged (Miwa, 1972). Tanikawa (loc cit) said that after the oil has separated the residue, called "cooked skin of whale", is eaten as a delicacy in the Osaka district of Japan.

Summers, Wong & Eyres (undated) reviewed work on shark liver oils; part of this report appeared in Summers & Wong (1992). They found that squalene, a triterpenoid hydrocarbon and precursor of sterols, was used to manufacture lubricants, pharmaceuticals and bactericides, and as a surface active agent in cosmetics. They reported claims that squalene prevented the formation of nitrosamines in topical products that contain an amine and a nitrosating agent. It was also said to increase skin permeability to topical ointment bases because of its miscibility with human sebum, where it also occurs naturally. Squalene has been used for centuries in many countries in skin

creams to soften skin, reduce small facial wrinkles, speed up wound healing, as a moisturiser and as a bactericide (a feature it has in common with other members of the terpenes family). It is often hydrogenated to various extents and used as squalane, which is more stable.

Summers et al investigated seven species of *Squalidae* that are common to the deep waters of the continental slope surrounding New Zealand; approximately 20% of the body weight was liver. It is believed that the large livers provide buoyancy for these deep-water sharks and contain energy sources adapted to their low oxygen environment. They found that all the livers they investigated contained a large proportion of lipid but the composition of the lipid varied from species to species.

These lipids typically consisted of a mixture of hydrocarbons (mainly squalene, and some pristane), diacyl and mono glyceryl ethers (compounds of fatty alcohols and glycerol by ether linkage) and triglycerides (esters of fatty acids and glycerol).

They used a thin layer evaporator to obtain almost pure squalene with minor levels of lipid oxidation at an operational temperature of 136°C. The purified squalene contained trace amounts of pristane, which is considered a skin irritant. However, when the degummed, bleached, deodorised and partly hydrogenated product was used by laboratory staff for over 6 months, they did not report any skin irritations. In fact they commented that, when used as a base for sunscreen lotion, it had excellent penetration qualities (penetrates the skin at about 2mm/sec), was not greasy (the most desirable feature) and did not develop off-odours.

Current interest in shark oils has focused on their purported effect on health. Anecdotal statements have fuelled the market. Components of shark oils were said to cure certain diseases, relieve pain and improve health generally. Traditional uses in folk medicines have been cited from Japan, China, Spain and the Scandinavian countries to support these claims.

The sharks named have included the Greenland shark (*Sumniosus microcephalus*) and Gulper sharks (*Centrophorus* spp.) from Scandinavian waters, from around Papua New Guinea (their liver oil is exported to Japan for the manufacture of skin creams) and from the cold waters of the Western Pacific where they are known as Aizame sharks (a Japanese name (Liu, 1998) - one label described the Aizame sharks as scarce). The names of other sharks are shown in Table 1.

However, none of these claims have been conclusively tested. The writer was unable to determine the volume of such products in the market. Yet, as peoples around the world grow older and potentially have more health problems, it is likely that the demand for health products will increase.

Mention is made in the popular and technical literature of various components in the oils, especially oils from deepsea sharks. (The possibility of using cheaper methods for preserving livers of sharks, as suggested by Summers et al, namely, using ensiling instead of refrigeration, may be extended to sharks captured from warmer and shallower waters and could lead to reducing the fishing pressure on deepsea sharks for their liver oils.) The function of these compounds in contributing to health remains incompletely understood. Squalene, for example, is a biosynthetic precursor of cholesterol yet it is claimed that it helps to normalise the blood cholesterol levels in people who eat a lot of fatty foods.

Table 1 Sharks whose livers are harvested

| | |
|--|---|
| Tope Shark (<i>Galeorhinus galeus</i>) | Tawny Nurse Shark (<i>Nebrius ferrugineus</i>) |
| Piked Dogfish (<i>Squalus acanthias</i>) | Sand Tiger Shark (<i>Carcharhinidae taurus</i>) |
| Basking Shark (<i>Cetorhinus maximus</i>) | Shortfin Mako Shark (<i>Isurus oxyrinchus</i>) |
| Stingray (<i>Dasyatis pastinaca</i>) | Bignose Shark (<i>Carcharhinus altimus</i>) |
| Cuban Dogfish (<i>Squalus cubensis</i>) | Spinner Shark (<i>Carcharhinus brevipinna</i>) |
| Catsharks (<i>Galeus</i> spp.) | Silky Shark (<i>Carcharhinus falciformis</i>) |
| Longfin Mako Shark (<i>Isurus paucus</i>) | Bull Shark (<i>Carcharhinus leucas</i>) |
| Hammerhead Sharks (<i>Sphyrna</i> spp.) | Blacktip Shark (<i>Carcharhinus limbatus</i>) |
| Saw Shark (<i>Pristiophorus nudipinnis</i>) | Oceanic Whitetip Shark (<i>Carcharhinus longimanus</i>) |
| Shortspine Spurdog (<i>Squalus mitsukurii</i>) | Blacktip Reef Shark (<i>Carcharhinus melanopterus</i>) |
| Leafscale Gulper Shark (<i>Centrophorus squamosus</i>) | Dusky Shark (<i>Carcharhinus obscurus</i>) |
| Birdbeak Dogfish (<i>Deania calcea</i>) | Sandbar Shark (<i>Carcharhinus plumbeus</i>) |
| Needle Dogfish (<i>Centrophorus acus</i>) | Sicklefin Lemon Shark (<i>Negaprion acudens</i>) |
| Lowfin Gulper Shark (<i>Centrophorus lusitanicus</i>) | Wide Sawfish (<i>Pristis pectinata</i>) |
| Longnose Velvet Dogfish (<i>Centroscyllium crepidater</i>) | Tiger Shark (<i>Galeocerdo cuvier</i>) |
| Mandarin Dogfish (<i>Cirrhigaleus barbifer</i>) | Whale Shark (<i>Rhincodon typus</i>) |
| Kitefin Shark (<i>Dalania licha</i>) | Silvertip Shark (<i>Carcharhinus albigmarginatus</i>) |
| Roughskin Shark (<i>Centroscyllium owestoni</i>) | Grey Reef Shark (<i>Carcharhinus amblyrhynchos</i>) |
| Bluntnose Sixgill Shark (<i>Hexanchus griseus</i>) | Giant Guitarfish (<i>Rhynchobatus djiddensis</i>) |
| Thresher Sharks (<i>Alopias</i> spp.) | Blue Shark (<i>Prionace glauca</i>) |
| Great White Shark (<i>Carcharodon carcharias</i>) | Whitetip Reef Shark (<i>Triaenodon obesus</i>) |
| Salmon Shark (<i>Lamna ditropis</i>) | Smalltooth Sand Tiger (<i>Odontaspis ferax</i>) |
| Porbeagle (<i>Lamna nasus</i>) | Smooth Hounds (<i>Mustelus</i> spp.) |
| Sawback Angelshark (<i>Squatina aculeata</i>) | Greenland Shark (<i>Somniosus microcephalus</i>) |
| Bramble Shark (<i>Echinorhinus brucus</i>) | Snaggletooth Shark (<i>Hemipristis elongata</i>) |
| | Plunket's Dogfish (<i>Centroscyllium plunketi</i>) |

One advertiser on the Internet claimed that squalene is helpful to people with heart disease, diabetes, hepatitis and allergies, among others. No mention of the specific varieties of these diseases was given. The same advertiser also said that it would generally enhance the quality of life, result in better skin and people who worked hard would feel less tired. Another substance found in shark liver oils in the early nineties, squalamine, was said to be a bactericide and later also believed to assist in curing infections involving yeasts, fungi and viruses and to strengthen the functions of the immune system.

Common fatty alcohols found in shark liver oil are chimylalcohol, batylalcohol, and selachylalcohol (also known as alkylglycerols or glycerol ether lipids, often shortened to G-E- lipids in popular publications and on the Internet). These have been cited as the compounds which support healthy immune system function when consumed in natural products such as shark liver oil. Since the fatty alcohols are more concentrated in lymph nodes, liver, spleen and bone marrow, and since these glands are in turn associated with the body's immune functions, the claims have also been extended to the immune functions of these organs. However, they have to be in their natural form to be most beneficial, a condition which is unlikely to attract funds for research. As a result, thorough testing has not yet been carried out.

Shark liver oil is packaged in capsules for oral consumption, and sold either in its purified form, or mixed with various other health enhancing substances for synergistic effects (also not yet rigorously proven). Labelling has become quite sophisticated, with quantitative details of ingredients, including amounts of squalene, omega-3 polyunsaturated fatty acids, alkylglycerols, vitamins, etc, and daily requirements may also be shown on the labels. Prices of capsules in Hong Kong were lower in September 1997 than the prices reported by Parry-Jones in 1996. He reported that bottles of between 40 and 180 capsules cost between HK\$238 and HK\$595 a bottle. However, in September 1997, the Australian, Canadian and American products were priced between HK\$100 and HK\$440 for a bottle of between 60 and 100 capsules, while a bottle of 80 capsules made in China cost HK\$200.

Conservationists say that shark liver health products do not have any beneficial effects, and that they just result in the killing of more sharks. One estimated that a tonne of shark liver oil was produced from between 2,500 and 3,000 sharks (cited in Rose, 1996). Republic of Korea imported 364 tonnes of shark liver oil in 1994; about a million shark livers, probably from deep waters, were harvested for their oils.

3 SHARK CARTILAGE PRODUCTS

The cartilage of sharks contains chondromucoids, collagen, chondroalbumins (Suzuki, 1972) and other substances. One proximate analysis gave the following: 41% ash (with large amounts of calcium and phosphorus), 39% protein, 12% carbohydrate, 7% water, about 1% fibre and about 0.3% fat.

Shark cartilage, not just shark fin, has been used traditionally as food by the Chinese and Japanese. For example, Tanikawa (1985) described the processing of boiled-dried cartilage ("meikotsu") made from pieces of jaw, fin and head parts. These are soaked in hot water, the meat is removed and then the cartilage is boiled and sun-dried. The product was also exported to China and possibly eaten as a health supplement as well.

In Hong Kong dried shark cartilage is sold as vertebral columns or as a by-product of shark fin processing. The former are mostly imported into Hong Kong from north and south America. They are cooked and eaten as food or boiled in soups or with herbs to improve health.

The vertebral columns are sold as cylindrical rods as most of the vertebral processes have been trimmed off to simplify cleaning. The rods are of various diameters and about a metre in length. Most of the meat has also been removed and where it remains the rod is discoloured. Some rods are bleached white. In September 1997 these were retailed at HK\$68 a kati (1 kati = 0.6 kg).

Fin cartilage is produced as a by-product of shark fin processing. The skin of the fin is peeled off, followed by the removal of the fin needles which are used in shark fin soup. The remaining fan-shaped fin cartilage is dried and sold. In September 1997 the price was HK\$38 a kati. However, most of the fin cartilage is exported to Japan, believed to be the largest producer of shark cartilage products. Traders in Hong Kong understand that the blue shark cartilage is preferred in Japan because this contains the most gelatinous material.

Recent interest in shark cartilage is concentrated almost entirely on its use in health supplements and as an alternative cure for certain diseases. Manufacturers of shark cartilage products claim that individuals have been cured of dreaded diseases and that sufficient observations have already been recorded for health authorities to justify clinical trials. They have also suggested that, until more definite results are available, sufferers should be encouraged to try it under proper medical supervision. A Dr Lane has been credited as raising the profile of shark cartilage. Although he believes that certain forms of cancer can be cured by shark cartilage, he has adopted the view that it "is not a miracle elixir" and "should not be viewed as a substitute for conventional therapy" (Lane, 1996).

As with shark liver oil, it is also claimed that all chemical components in shark cartilage should be present in their natural proportions to enhance their synergistic effects. However, references are made to chondroitin as one of the active ingredients. Over 25 years ago, Suzuki (1972) described the extraction of chondroitin sulphate (also simply called chondroitin) by hydrolysing the chondromucoids in shark cartilage. She also reported then that it was believed to be a remedy for arthritis and a method of ageing retardation in Japan. As people live longer, arthritis and ageing retardation will attract more and more attention.

In fact, the use of shark cartilage products in health products and cosmetics overlaps that of shark liver oil, including its claims as a cure for various cancers. It is also used in the treatment of rheumatism, haemorrhoids, shingles, psoriasis and diabetic retinopathy. One advertiser additionally listed shark cartilage as effective against eczema, colitis, enteritis, poison ivy/oak, acne, varicose ulcers, phlebitis and cold sores.

The number of references to shark cartilage on the Internet far exceeded those to shark liver oils. On one day in

February 1998, there were 123 184 references to cartilage, compared to 1 230 for shark liver oil on the same website. Yet, in the FAO publication in 1974 entitled *Fishery Products* edited by R Kreuzer, there was no mention of shark cartilage in contrast with the numerous references to shark liver oils. In Kreuzer & Ahmed (1978), there was equally scant reference to cartilage in comparison with shark liver oils although there was a reference to the use of chondroitin in eye drops, to which we will return.

Trade figures are not available for shark cartilage tablets or powder, nor for shark liver oil capsules. They are likely to remain poorly reported until the products are more clearly defined and regulatory procedures are in place.

A comprehensive report by TRAFFIC outlined the trade practices in the preparation and sale of shark cartilage. Rose (1996) observed that the processing of shark cartilage was labour intensive, as was the processing of shark fin, and was carried out in many parts of the world. Production was carried out when orders were received and there was a certain amount of specialisation; primary producers prepared the raw material, for example, but did not necessarily produce the tablets. Marketing of the tablets was also carried out by agents; for example, shark cartilage tablets sold in Singapore were purchased through agencies rather than directly from manufacturers. This was probably because of the small quantities sold in individual retail outlets.

Rose (loc cit) also concluded that shark cartilage production was probably not a threat to shark survival. An example she gave of financial returns to a United States-based harvester of a 23 kg shark was: cartilage US\$2, fins US\$25 and meat US\$12.50. She mentioned that dried shark cartilage cost about US\$1 per pound (0.45 kg) in the United States and Mexico, but Fahmeda Hanfee (1996) reported that in India they fetched US\$15-20 per kg, although it was unclear if it had been a more highly processed material.

Although there is much emphasis on quality control to preserve the shark cartilage in its natural form, there is very little reported on its preservation after the shark is landed in fishing boats.

Producers claim that to produce high quality cartilage products it is essential to remove meat and gristle by hand, without using strong or corrosive chemicals which may result in its denaturation. Natural food enzymes may be used for the final cleaning, after which the cartilage is sun dried (as with shark fin) and air dried if necessary. The cartilage chips are milled into a fine powder and then sterilized. During the above processes the cartilage is kept cool and the use of strong or corrosive chemicals and radiation are avoided. Cartilage tablets or powder may be sold on their own or fortified with various health enhancers.

Prices of shark cartilage tablets have recently fallen in Hong Kong with the appearance of more brands and perhaps a healthy scepticism among consumers. Parry-Jones (1996) found that bottles of between 45 and 100 tablets cost between HK\$310 and HK\$868 a bottle, whereas in September 1997 a bottle of 30 tablets produced in Australia cost HK\$60 and a bottle of 90 tablets produced in the USA cost HK\$480. In Singapore in February 1998 a 30-tablet bottle cost S\$15.

Labelling is sophisticated and shows the quantity of shark cartilage present. Other natural products believed to promote health may also be included to widen the functions of the product, and quantitative details and daily requirements may also be shown on the labels.

Unlike shark liver oil, which tends to glamorize deepsea sharks, shark cartilage is made from both deepsea and tropical sharks and the tablets manufactured from both types of sharks are sold in similar strengths. This may be one of the reasons why the species of sharks used for making cartilage tablets and powders have not been named (Rose, 1996). Unlike oils produced for internal use, which are taken only orally, shark cartilage is taken internally either orally or rectally, preferably rectally to avoid its digestion and the side-effects some people experience. The label on one package stated that "the most common side effects can include abdominal pain, constipation, diarrhoea, stomach upset, nausea and skin rash" and may also have "serious side effects, including stomach ulcers and intestinal bleeding". Better understanding of the product has also prompted warnings against taking the cartilage under certain conditions, including pregnancy, breast feeding, recent surgery and heart or circulatory problems. Lane (1996) supported oral use, citing studies which showed that little digestion of shark cartilage took place in the stomach before it was absorbed into the blood.

Chondroitin has been mentioned earlier. It has established its pharmaceutical use (Martindale, 1996). This standard text describes it as an acid mucopolysaccharide which is present in most mammalian cartilaginous tissues. It has been given to patients with ischaemic heart disease, for the treatment of osteoporosis and related disorders and hyperlipidaemia. A medium containing chondroitin sulphate A has been used to preserve corneas for transplantation and preparations containing it or its sodium salt have also been used as adjuncts to ocular surgery.

It is interesting to note that Indian traders referred to its connection with heart diseases when reporting their sales of shark cartilage to Europe (Fahmeeda Hanfee, 1996), a point hardly emphasised by traders and manufacturers of cartilage products in other countries.

Much attention is focused on the use of shark cartilage and shark liver oil for treatment of diseases. The layman is, however, much confused by conflicting information; terminally ill people looking for cures need guidance but may be unsettled by answers from their health professionals. It would be helpful if a committee could be formed to review the literature regularly to provide this guidance in a more organized fashion, possibly also lending impetus to better management and conservation of sharks.

The origin of some of these claims is probably to be found in studies where the growth of tumours in animals was slowed. This has been strengthened by observations that it limits the growth of cancer, especially cancerous tumours, by inhibiting the development of blood vessels in these tumours. Other diseases linked with this arc arthritis, eczema, acne, ulcers, haemorrhoids and cold sores.

It has been claimed as "a major cancer breakthrough" by one advertiser on the Internet. But a study presented to a meeting of the American Society of Clinical Oncology in Denver in May, 1997 said that shark cartilage was inactive in patients with advanced stages of breast, colon, lung and prostate cancer (Shark News, 1997). An Internet release from the University of Florida (1998) stated that no convincing clinical trials were found to support the claim that it cured cancer. Nevertheless, we can expect a continued demand for shark cartilage because people desperate for a cure for terminal cancer will try any alternative treatment that offers a glimmer of hope.

4 SHARK SKIN PRODUCTS

Shark skin is eaten as food in some countries. In some islands in the South Pacific, it is considered excellent (Matthew, 1996). In Taiwan Province of China the caudal skin of the White-spotted Guitarfish, *Rhynchobatus djiddensis* (Chen et al, 1996) is valued above all other shark skin. In countries where it is eaten, the skin is usually dried or smoked before it is finally cooked, and may have some meat attached as well. However, only a small amount of skin is eaten around the world.

The Chondrichthyes have rough and hard placoid scales (Marshall, 1962), which are usually minute, but vary greatly in shape; they can also develop in certain parts of the body into prominent tubercles or spines. When set closely together, these small scales give the skin surface the character of fine emery paper or cloth, which has resulted in its being used for sanding wooden and ceramic objects. Untanned skins are called shagreen, a term which includes the untanned leather from horses and seals (Tanikawa, 1985). Shagreen was formerly used for various polishing purposes in the arts, for armour, sword-hilts, and as a striking surface for lucifer matches.

Since each placoid scale body has the same basic structure as a tooth and differs in superficial structure and arrangement in different groups, they are used for identification (Marshall, 1962). The stingray carries a sting, which is a highly specialized and dangerous integumentary structure that is characteristic of the dasyatid sting rays (Family Dasyatidae).

Most of the skin which is used is made into leather. Kreuzer & Ahmed (1978) describe the cutting and skinning of sharks, and the grading of skins, which are usually salted before storage and transportation to the tannery.

Shark skin is tanned in much the same way as the skins of land animals. Tanikawa (1985) describes the process in detail and distinguishes between that in Japan, where hydrochloric acid was used, and the United States' use of sulphuric acid. He also describes the processes used in the tanning of fish skin.

In Japan the hides of whale and shark were used to produce leather until the 1940s (Tanikawa, loc cit). This industry was threatened when considerable quantities of land animal hides were imported and never regained prominence. An entry in the *Encyclopaedia Britannica* (1972) states that by the early 1960s about 97% of the world's supply of hides and skins derived from the production of meat or wool was tanned into leather. It is no surprise then that shark and fish skins moved into niche-leather markets in Japan, providing textural and beautifully speckled colours for purses, hand-bags, Japanese sandals, watch straps, etc. This is probably an extension of the niche established by the elegant and expensive Boroso leather, which is made from the hides of small Morocco sharks; the denticles are not removed but instead polished to a high gloss.

Although a market for shark leather developed in the USA, Rose (1996) found that it was difficult to sustain. Among the various reasons she cited, its use in protecting the attached meat against physical, chemical/biochemical and bacteriological deterioration may have been the most important. Moreover, shark is not necessarily the poor man's meat now that its handling is much better understood. The production of good quality meat requires that the shark landed on board fishing boats be gutted, washed in fresh water, stored in ice or refrigerated, which results in the loss of hides of good quality. The usual shark fishery also found it difficult to supply the necessary numbers of hides consistently to sustain an industry. It is in those countries where dried/salted meat of the larger sharks (preferably a meter and a half in length or larger) is produced that the shark skin industry has been able to survive. One such country is Mexico where there are a number of tanneries. It is also next door to the United States where a relatively ready market for shark skin products exists.

Products made from shark skin, either with or without denticles, as advertised on the Internet include shoes, cowboy boots and sandals, wallets/purses, coin/key fobs, belts, key cases, lighter cases, cigar cases, watch bands, gun holsters and knife holders. Some advertisers on the Internet also offer to make items according to their customers' designs, including choice of colours, and presumably leather specifications; the terms and conditions have to be negotiated of course. In India, besides the above items, shark skin is also made into grips for scooter/bicycle handle covers.

Rose (1996) provides a comprehensive summary of TRAFFIC's survey of the world's markets and trade in shark leather. The demand for shark leather is not believed to threaten the existence of sharks. A list of the species of sharks used for leather is listed in Table 2.

Table 2 Sharks whose hides are used as leather

| | |
|--|---|
| Tiger Shark (<i>Galeocerdo cuvier</i>) | Spotted Wobbegong (<i>Orectalabius maculatus</i>) |
| Nurse Shark (<i>Ginglymostoma cirratum</i>) | Ornate Wobbegong (<i>Orectalabius ornatus</i>) |
| Lemon Shark (<i>Negaprion brevirostris</i>) | Tasselled Wobbegong (<i>Eucrossorhinus dasypogon</i>) |
| Dusky Shark (<i>Carcharhinus obscurus</i>) | Spinner Shark (<i>Carcharhinus brevipinna</i>) |
| Sandbar Shark (<i>Carcharhinus plumbeus</i>) | Great White Shark (<i>Carcharodon carcharias</i>) |
| Bull Shark (<i>Carcharhinus leucas</i>) | Broadnose Sevengill Shark (<i>Naturnychus cepedianus</i>) |
| Porbeagle (<i>Lamna nasus</i>) | Thresher Sharks (<i>Alopius</i> spp.) |
| Shortfin Mako Shark (<i>Isurus paucus</i>) | Tawny Nurse Shark (<i>Nebrius ferrugineus</i>) |
| Scalloped Hammerhead (<i>Sphyrna lewini</i>) | Basking Shark (<i>Cetorhinus maximus</i>) |
| Shortnosed Saw Shark (<i>Pristiophorus nudipinnis</i>) | Piked Dogfish (<i>Squalus acanthias</i>) |
| Blue Shark (<i>Prionace glauca</i>) | Kitefin Shark (<i>Dalatias licha</i>) |
| Taiwan Gulper Shark (<i>Centrophorus niaukang</i>) | Sawback Angelshark (<i>Squatina aculeata</i>) |
| Great Hammerhead Shark (<i>Sphyrna mokarran</i>) | |

5 SHARK TEETH AND JAW PRODUCTS

Sharks have powerful jaws. Some sharks have sharp and pointed teeth with rough cutting edges adapted for predation on other fishes. Others have flattened teeth adapted for crushing the shells of the crabs and molluscs on which they feed. According to Kreuzer & Ahmed (1978) small shark teeth are little used by humans. The larger ones have been used in traditional weapons and incorporated into ceremonial items or they are made into trinkets, curios or jewellery, especially as souvenirs for tourists.

The uses of teeth and jaws of sharks have been surveyed by TRAFFIC and summarised in Rose (1996). These include their use in traditional art works in certain islands in the South Pacific. The Gilbertese lash the teeth of sharks to the cutting edges and the spike of stingrays to the points of their traditional fighting swords. Shark teeth are used for cutting in Hawaii, and have also been fitted as knives, war clubs and other weapons.

The other more recent use of shark teeth is more selective. Compared to meat, liver and other easily denatured products, teeth are certainly easier to harvest and preserve. Rose (1996) cited earlier sources indicating the Mako, Great White and Tiger sharks as the species preferred for their teeth, because of their large size. Advertisements have appeared on the Internet offering teeth from precisely these sharks for sale. The teeth may be set in precious metals or encased in other materials, e.g. leather of various colours, and worn as necklaces. A company in Australia also enhance their setting with opals. The largest tooth (at 2 inches) the company offered from the Mako shark, set in either silver or gold, was priced at US\$129.95. The smallest mako tooth advertised was 1 inch, set in the same way and offered at a price of US\$39.95.

The jaws of sharks are also stuffed and offered for sale on the Internet. The jaws of certain sharks have been eaten as traditional food.

The display of teeth and jaws for sale is usually confined to tourist areas in Asia, America, Europe and Africa. The volume of teeth and jaws is not clearly known, but obviously they are by-products of shark fishing. Since they do not need preservation they may even be collected by traders only when their inventory is low.

6 OTHER USES

The following is a compilation of items which have been observed by various writers from around the world and recorded in some detail by Rose (1996).

- Small sharks are often used as bait, at times to catch other larger sharks or used in fish traps.
- Sharks may be preserved for sale as curios. These include whole small sharks and rays or parts of their bodies.
- The rostra of the sawfish are also dried for sale to tourists.
- Glue is made from certain sharks and fish, which may in turn be used in the manufacture of lacquerware.
- Small sharks are often made into fishmeal and fertilizer.
- There is a quite widespread use of dogfishes as specimens for dissection in schools and universities.
- More recently, fairly large marine sharks have been exhibited in public aquaria.
- Small specimens of freshwater sharks and rays are also kept in private tanks.
- Organizing dives among sharks is becoming popular in several countries, attracting mainly conservationists, and may be gaining attention and support from businesses and governments for different reasons.

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APPENDIX IV. COUNTRY AND REGIONAL STUDIES

APPENDIX IV.1

HONG KONG

by HOOI KOK KUANG

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1 BACKGROUND

In 1978 FAO and the International Trade Centre UNCTAD/GATT issued a joint publication, *Shark Utilization and Marketing* by Kreuzer & Ahmed (1978). This became a landmark publication but, at the same time, showed that follow up work was necessary. The joint study sought information on resources, marketing and technical and production problems, to enable countries to develop their shark fisheries. Since then many publications have been released by FAO on elasmobranchs.

Twenty years is a long time in fisheries and the characteristics of shark fisheries have changed faster and somewhat differently from other fisheries. The American Elasmobranch Society and the Japanese Group for Elasmobranch Studies, for example, have been formed and met to exchange information on advances. It was realized that shark landings were not adequately recorded, they were difficult to identify and in almost all records they are not sorted into species. At worst they were recorded as miscellaneous catches. Fisheries sciences have also seen tremendous advances and an update of the publication on shark utilization and marketing was necessary.

Besides, conservationists around the world began to consider that some shark and rays species were being threatened. The Shark Specialist Group was formed under the IUCN Species Survival Commission and world opinion was being organized. Education and public awareness programmes by green groups are beginning to have an impact. Shark fin traders have also begun to accept that more rational exploitation would ensure the continuation of their business.

The writer's contract was, "To write in depth on the Hong Kong market in shark products. Identify shark products by species with photographs and, if possible, to identify the species from which the fins or other products are coming." This study was conducted through a literature review, updated from official trade and other statistical records, through interviews with traders and researchers and through correspondence. The writer wishes to thank each person who has contributed to this study; any errors of course remain his own.

The most important shark product traded in Hong Kong is shark fin. It is on this product that most of this report is focused. Hong Kong is a trader, processor and consumer of shark products, with each activity influencing the other. Some reference is also made in the report to countries in Southeast Asia where shark products are traded and consumed among the Chinese.

2 MEAT

The world catch of elasmobranchs in 1991 amounted to about 0.7 % of the total fish landed (Bonfil, 1994). In the same year, SEAFDEC (1993) showed that the equivalent was 1.95 % for the combined landings of Indonesia, Malaysia, Philippines, Singapore, Taiwan Province of China and Thailand, indicating that Southeast Asian countries are rather better endowed than the rest of the world. Nevertheless, the percentage of sharks in total landings in Hong Kong in 1991 was 0.51 %. It appears quite deficient, even compared to the rest of the world. In 1994 (SEAFDEC, 1997), 1995 and 1996 (Fish Marketing Organization), Hong Kong's shark landings were less than half of one % of total landings.

SEAFDEC records sharks separately from rays and all the countries mentioned above, except Hong Kong, provided landing figures for both. In Hong Kong the catch of rays is shown under miscellaneous fish. The average price in 1991 of rays in all the above mentioned countries was US\$0.27/kg, and sharks were US\$0.24/kg, or approximately 11 % lower. In West Malaysia, the price for sharks was US\$0.33/kg, and for ray was US\$0.85/kg, or about 2.6 times the price of sharks.

In Hong Kong rays are seldom seen in the fishing ports. It is assumed that the waters on the west are too fresh and on the east, where eagle rays sometimes occur, they are followed by those sharks which prey on them. Incidentally, shark alerts were sounded in May-June of 1991, 1993 and 1995. These sharks were believed to be tiger or bull sharks (Leung, 1997).

Traditionally, the consumption of shark and ray meat in Hong Kong was not widespread. They were eaten by the poor and persons who lived on the waters. Shark or rays were not even included in foods sold in budget eating places and definitely not in the more classy restaurants. When Hong Kong embarked on an aggressive programme of land reclamation to house its people, some groups, in particular the *Tung Kah* who mostly lived in boats, dispersed as a community and integrated well, and the eating of sharks in households seemed to disappear. However, it could be reviving, despite its traditional association with poverty, which Hong Kong persons are careful to avoid.

Consumption of sharks and rays appear to be linked loosely with the different dialect groups among the Chinese. In Hong Kong, where about 98 % of locals are Chinese, mainly from nearby Guangdong Province, eating shark meat is not fashionable. The Singaporean Chinese are more willing to eat sharks and rays. There are consequently tasty recipes for them at open-air eating spots. In Taiwan Province of China the meat of 7 species of sharks is relished (Chen, et al, 1996), with special preference for the "belly" meat of the Blacktip Reef Shark (*Carcharhinus melanopterus*), which they describe as the most delicious. These authors also said that shark utilization in Taiwan Province of China is relatively complete, depending on the species involved. The fins, meat, skin, liver and other internal organs are used and sharks also support industries such as fish jelly products, fishmeal and fertilizer.

Approximately five years ago fishing boats in Hong Kong which targeted sharks ceased operations and sharks are now captured only as a by-product (Leung, 1997). Kreuzer & Ahmed (1978) reported that shark landings in Hong Kong declined steadily from 2 200 tonnes in 1971 to 1 245 tonnes in 1976. The decline continued and in 1991 1 017 tonnes were landed, further declining to 228 tonnes in 1996 (SEAFDEC and Table 1).

According to Kreuzer & Ahmed (1978) and Parry-Jones (1996), shark meat was used in the production of fish balls. Shark meat has indeed been used for making fish balls in Hong Kong; it has also been scientifically investigated in Taiwan Province of China (Jeng & Hwang, 1979). It was added to certain fish jelly products, including fish balls in Hong Kong, because it sets rather slowly, even in warm weather. The prepared paste was delivered daily between 6 and 7 am; from factories to retail outlets within 2 hours. They shaped the paste, which may also contain chopped/minced meat and/or vegetables to taste, into end products before it set. It was also added as an extender when shark prices were lower than for other fish. About 85-90 % of fish balls in Hong Kong are made directly from fish while the rest are made from surimi, which is currently also used for producing *dim sum*. About 20-40 % of shark meat was normally added to the cheaper varieties of fish balls. These shark meat products have less springiness than the Chinese enjoy (Tong, 1997). It was also used in filling vegetable and soya bean products called *yeung tau fu*. However, by the time shark meat rose to HK\$3-4 per kati^{*} it became uneconomical to use. The volume was also too small to be worth transporting from the shark fin to the fish ball processing factory. According to Mr Tong, whose market share of fish balls in Hong Kong exceeds 50 %, shark meat has not been used for making fish balls in Hong Kong for at least 2 years.

On the morning of 10 September 1997, at Castle Peak Wholesale Fish Market, a small quantity of whole sharks were auctioned. I was impressed with the meticulous recording system being used. Smaller sharks were cheaper than larger sharks of up to 6 kg. This is the quite the opposite of the prices in Singapore where the smaller sharks were more expensive. The reason seemed to be that the Singaporean bought the shark primarily for its meat, whereas the Hong Kong buyer is a fin processor. The cheapest was auctioned off at HK\$8.5 per kati and the highest priced that morning was HK\$17.0 per kati. These prices are beyond those fish ball producers are prepared to pay. Indeed, prices seem to have been moving upwards for some years. According to SEAFDEC, prices in 1992 exceeded those in 1991 (US\$0.65/kg compared to US\$0.48/kg, respectively). The Fish Marketing Organization of Hong Kong reported that the average auction price for sharks of all sizes in 1995 was HK\$6.30 per kati, in 1996 was HK\$8.72 per kati, and for January-July of 1997 was HK\$11.65 per kati (Agriculture & Fisheries Department).

Although the price of carcasses would be lower once the fins were removed, the quantity of sharks is probably too small (less than one tonne per day in 1995 and 1996) for a collection system to be set up and maintained. Moreover, the landings are probably seasonal. Only 16 tonnes were landed in the first half of 1997 while the total catch for each of the preceding years was 230 tonnes. I was informed by officials in the Castle Peak Wholesale Market that they had noticed the prices of sharks begin to climb, especially in recent years. They opined that it coincided with the publicity over shark products and health.

* 1 kati=0.6 kg

This may bring about a revival of the consumption of shark meat in Hong Kong. Parry-Jones (1996) reported on imports of small quantities of dogfish and other sharks in Hong Kong between 1992 and 1995. Most of them were re-exported. The average cost of the meat was between US\$3.7/kg in 1994 and US\$7.4/kg in 1992; the most expensive import being 300 kg from Peru in 1993 at an average cost of US\$13.9/kg. As these prices are way above those of sharks landed locally, it appears that the meat was to provide for quite a different market.

In Hong Kong sharks and, whenever they do appear, rays are supposedly consumed in soups and stir fried with garlic and fermented soya beans. Hong Kong persons call these low budget foods "taste and appetite enhancers". Cooked with popular sweet and sour sauces they help the staple rice diet go down more easily (Tong, 1997).

3 FINS

3.1 Volumes

Kreuzer & Ahmed in 1978 found that Hong Kong was the largest market for shark fins in the world. It has remained so ever since. SEAFDEC records showed that in 1992 Hong Kong and Singapore imported between them 98 % of the total world imports of shark fins (in value) into Southeast Asia, of which Hong Kong took 85 %. Singapore's imports, at 13 %, were a poor second by comparison. In fact, while Singapore exported shark fins worth about US\$28 million to Hong Kong in 1994, Hong Kong sent only about US\$5 million to Singapore. Hong Kong's leading position will probably be confirmed, if not enhanced further, now that it is a Special Administrative Region (SAR) of China. While it has achieved its dominance as the world's largest trader in shark fins without China's help, Hong Kong will reach a higher level when extra help comes from China. Traders, however, feel that other provinces in China may challenge that position.

In 1972 Hong Kong imported 2 421 tonnes of shark fins worth HK\$43.8 million (Kreuzer & Ahmed, 1978). By 1982, this had increased to 2 746 tonnes valued at HK\$245.4 million (Lai, 1983). In 1996, the amount of shark fin imported was 7 846 tonnes valued at HK\$1 859.4 million, rising from 5 292 tonnes valued at HK\$1 463.9 million in 1993 (Hong Kong Agriculture & Fisheries Department, 1997), indicating a phenomenal growth in recent years.

Some of this is re-exported without further processing. There is a lag-time between the import and export of fins so that the figures may not necessarily refer to the same fins. However, over a sufficiently long period of time the figures do show trends, and in order to get these figures the volumes and values have been pooled and averaged for comparisons in this report. During the period examined, the volume of shark fins imported exceeded that re-exported in the form they were originally imported.

Hong Kong has another category in its trade statistics, "domestic exports", to reflect those fins which are produced locally and all those fins, whether of local or foreign origin, which are further processed. The volumes of these domestic exports are small in comparison with figures of imports and re-exports.

Hong Kong also lands a small quantity of sharks at its 7 fishing ports strategically located along the coast. These landings have declined and now do not contribute significantly to the fisheries of Hong Kong (Agriculture & Fisheries Department).

Table 1 shows the basic figures of total imports, total re-exports, total domestic exports and shark landings in Hong Kong's landing and wholesale markets/ports. They are provided as a preliminary reference only. A more detailed examination will be made later.

Table 1 Import and export of fins and local production of sharks (tonnes)

| | 1993 | 1994 | 1995 | 1996 | 1997 (Jan-Jun) |
|------------------------|------------------|------------------|------------------|------------------|-------------------|
| Total imports | 5 202 | 5 704 | 7 309 | 7 845 | 4 042.0 |
| Total re-exports | 2 703 | 3 373 | 4 548 | 5 331 | 2 896.0 |
| Total domestic exports | 30 | 48 | 40 | 23 | 0.3 |
| Shark landings | ¹ 848 | ¹ 688 | ² 233 | ² 228 | ² 16.0 |

Source: Census and Statistics Department

¹ SEAFDEC 1991, 1992, 1993 & 1994. Fishery Statistical Bulletin for the South China Sea Area

² Fish Marketing Organization, Hong Kong

Kreuzer & Ahmed's (1978; Table 44) figures for an item they called "apparent consumption" of shark fins for 1972 to 1976 put the range between 1 894 and 2 309 tonnes a year. However, they excluded the domestic export component entirely, possibly because it was so small when compared with the other items.

This domestic export was assumed to be dry (processed), and recalculated into equivalent dry fin (ie, unprocessed) weights. Nair & Madhavan (1974) reported a recovery range of between 2 and 25 % of fin needles from various categories of fins. Traders are probably less exacting because they said they expected a regain of 29.5 % in one case, and between 25 and 33 % in another. For the estimates used in Table 2 29 % is used.

In addition, Kreuzer & Ahmed ignored the local production of fins and the figures provided by them are different from those provided by Parry-Jones (1996) in his Appendix 2:1 for corresponding years. The calculation for dry fin equivalent is based on the findings of Anderson & Ahmed (1993). They found that dried fins made up about 1.44 % of the total body weight of sharks. This percentage is used as a rough estimate of the dry fins produced locally in Hong Kong, although it has been said that some fins may be picked up at sea from fishing boats of other nationalities.

Table 2 Recalculation of Kreuzer & Ahmed's data for apparent consumption of shark fin (tonnes)

| Hong Kong | 1972 | 1973 | 1974 | 1975 | 1976 | Total | Annual Average |
|-------------------------------|---------|---------|---------|---------|---------|--------|----------------|
| Imports ¹ | 2 421 | 2 368 | 2 028 | 2 470 | 2 250 | 11 537 | 2 307 |
| Local production ² | 32 | 26 | 30 | 26 | 18 | 132 | 26 |
| Re-exports ³ | 150 | 176 | 134 | 161 | 227 | 848 | 170 |
| Domestic exports ⁴ | 62 | 31 | 34 | 21 | 38 | 186 | 37 |
| Apparent consumption | 2 241 | 2 187 | 1 890 | 2 314 | 2 003 | 10 635 | 2 127 |
| Population (thousands) | 4 115.7 | 4 212.6 | 4 319.6 | 4 395.8 | 4 443.8 | | 4 297.5 |
| Grams per person | 544 | 519 | 437 | 526 | 451 | 2 477 | 495 |

Source: ¹ From Table 41 of Kreuzer & Ahmed (1978)

² From Table 40 of Kreuzer calculated by formula: Local catches x 0.0144

³ From Table 43 of Kreuzer & Ahmed (1978)

⁴ From Table 42 of Kreuzer calculated by formula: Domestic export x 100/29

When the domestic exports and local production are taken into consideration, shark fins retained in Hong Kong range between 1 890 and 2 314 tonnes annually. The figures above are close to Kreuzer & Ahmed's in Table 44. They said that domestic production could be equal to or higher than the domestic exports and therefore their figures could be considered as minimum consumption. The recalculated figures for the years 1972-6 imply an average consumption of 495g per person per annum. This is in the form of dry fins, before further processing.

In their report Kreuzer & Ahmed (1978) remarked that "no clear pattern of growth or shrinkage emerges". After taking other related information into consideration they believed that the trade was driven by supply limitations rather than by those of demand. Traders were constantly on the look out for sources of supply in the 1970s. Twenty years later we find that there was clearly a tremendous increase in total imports from around 2 000 tonnes to over 7 000 tonnes by 1995 (Table 1). The expansion in imports was probably stimulated by the attractiveness of increased prices, which increased the sources of supply from about 60 countries then to over 100 in the 1990s. However, in terms of apparent consumption the growth was less spectacular.

Similar figures were calculated for 1993 through 1996, and shown in the following tables. However, a further adjustment has to be made because of the introduction of technological advances into the trade in shark fins. Kreuzer & Ahmed remarked (p.33) that "fins are marketed in many forms, but the primary producer usually ships them in dried form only." Further, they noted that Hong Kong importers wanted only dried unprocessed

fins. It is therefore quite safe to conclude that they reported almost, if not all imports of dried fins into Hong Kong.

In addition to dry fins, wet fins were also traded between 1993 and 1996; the weight of water therefore has to be deducted from the wet fins so that the figures from the different time periods can be properly compared. Indeed, the Census & Statistics Department reports these two categories of fins as follows. One was under "dried fish, whether or not salted but not smoked". This was taken as dried fins in whatever form, but not smoked. The other was under "fish, salted but not dried or smoked and fish in brine". This was taken as wet fins, but not smoked. Essentially, the difference was dry and wet. An officer mentioned frozen in connection with wet fins, but did not elaborate further.

Anderson & Ahmed (1993) estimated that wet fins are about 4.5 % body weight of the shark, and dry fins about 1.44 %. This implies that wet fins lose 68 % moisture when they are properly dried. When asked to give the price for similar pieces of dried and wet fins, a trader said that he would offer \$50 for a dry fin and \$14 for the wet fin. The proportions are very close to, but a little lower (28 %) than the regain figure expected from more formal observations. It was decided to split the difference, and use a regain of 30 % for the following calculations.

Table 3 Imports and re-exports of wet shark fins (kilograms)

| Year | Imports | | Re-exports | |
|-----------------|-----------|----------------|------------|----------------|
| | Wet | Dry equivalent | Wet | Dry equivalent |
| 1993 | 536 931 | 161 079 | 284 015 | 85 204 |
| 1994 | 468 981 | 140 694 | 393 925 | 118 177 |
| 1995 | 1 187 506 | 356 252 | 905 126 | 271 538 |
| 1996 | 1 849 501 | 554 850 | 1 783 133 | 534 940 |
| 1997 (Jan-June) | 1 006 619 | 301 986 | 1 003 796 | 301 139 |
| Sub-total | 5 049 538 | | 4 369 995 | |

Source: Census & Statistics Department

Dry equivalent=Wet x 0.3

Figures from Table 3 were then used to compile Table 4 to show the corresponding import and re-export of dry and equivalent dry fins.

Table 4 Dry and equivalent dry fins Imported and re-exported (tonnes)

| Year | Imports | | | Re-exports | | |
|----------------|------------------|-----------------------------|--------|------------------|-----------------------------|--------|
| | Dry ¹ | Dry equivalent ¹ | Total | Dry ¹ | Dry equivalent ¹ | Total |
| 1993 | 4 755 | 161 | 4 916 | 2 419 | 85 | 2 504 |
| 1994 | 5 235 | 141 | 5 376 | 2 979 | 118 | 3 097 |
| 1995 | 6 122 | 356 | 6 478 | 3 642 | 272 | 3 914 |
| 1996 | 5 996 | 555 | 6 551 | 3 548 | 535 | 4 083 |
| 1997 (Jan-Jun) | 3 035 | 302 | 3 337 | 1 892 | 301 | 2 193 |
| Sub-total | 25 143 | | 26 658 | 14 480 | | 15 791 |

Source: ¹ Census & Statistics Department

² Figures from Table 3

Table 3 shows that considerable amounts of wet fins are re-exported in the condition they were imported; the percentage ranged from 52.8 % in 1993 to 99.7 % in the first half of 1997. These proportions did not rise gradually, indicating clearly that there are time lags and other considerations in the trading of fins. It is observed that consumption of fins begins to rise each year around the eighth month of the lunar calendar, and taper off after the lunar New Year. (Dates on the lunar calendar are different from the Gregorian calendar.)

The figures were then pooled to give the sub-totals for trade volumes. The amount of wet fins re-exported was 86.5 % during 1993-7 (Table 3), while the amount of dry fins re-exported without any further processing was 57.6 % (Table 4); about 30 % less. This percentage indicates that traders are more likely to re-export wet fins. Since wet fins probably incur higher storage costs they are probably re-exported or processed soon after import, especially in the warmer summer months. Between 1993 and 1997, 75 to 91 % of all wet fins re-exported went to China (Census & Statistics Department).

We now calculate the corresponding dry fin equivalents for domestic export and local production (Table 5). The domestic exports are recorded in dry and wet fins, but product descriptions were lacking. It was therefore assumed for this report that they are processed dry and wet fins.

Table 5 Dry fin equivalents for domestic export and local production (tonnes)

| | 1993 | 1994 | 1995 | 1996 | Total (1993-6) |
|--|------|------|------|------|----------------|
| Domestic exports, dry fin ¹ | 11 | 30 | 29 | 12 | 82 |
| Domestic exports, wet fin ¹ | 19 | 18 | 11 | 11 | 59 |
| Domestic exports, dry fin equivalent | 65 | 61 | 37 | 38 | 201 |
| Domestic exports, sub total | 76 | 91 | 66 | 50 | 283 |
| Local fin production ² | 848 | 688 | 233 | 228 | 1 997 |
| Local dry fin equivalent production | 12 | 10 | 3 | 3 | 28 |

Source: ¹ Census & Statistics Department

² From Table 1

Domestic exports, dry fin equivalent=Domestic exports x 100 B 29

Local dry fin equivalent production=Local fin production x 0.0144

We recall that Kreuzer & Ahmed said that domestic production could be equal to or higher than domestic exports in the seventies. We see that in the 1990s domestic exports far exceeded local production but that they are both decreasing with time (Table 5). Since they are both activities concerned with processing, this indicates that this labour intensive activity is on the decline in Hong Kong.

Table 6 Dry fins retained in Hong Kong (tonnes)

| | Imports | Local fins | Re-exports | Domestic exports | Total retained |
|-----------|---------|------------|------------|------------------|----------------|
| Source | Table 4 | Table 5 | Table 4 | Table 5 | (A+B)-(C+D) |
| | A | B | C | D | |
| 1993 | 4 916 | 12 | 2 504 | 76 | 2 348 |
| 1994 | 5 376 | 10 | 3 097 | 91 | 2 198 |
| 1995 | 6 478 | 3 | 3 914 | 66 | 2 501 |
| 1996 | 6 551 | 3 | 4 083 | 50 | 2 421 |
| Sub-total | 23 321 | 28 | 13 598 | 283 | 9 468 |

The imports and re-exports show a similar trend, as they should, in both the raw and re-calculated figures. This trend indicates Hong Kong's strengthening hold on the shark fin entrepôt trade. The presumed local production of dry fins from sharks landed in Hong Kong and domestic exports of processed fins declines steadily over the years. This continued fall in quantity of sharks landed, which was also noticed by tradesmen at the Castle Peak Fishing Port, and the steady decline in local shark fin processing coincides with the ever increasing cost and shortage of skilled technicians.

Table 6 shows total retained dry fins ranged between 2 198 and 2 501 tonnes in this period. This is more than in the 1970s but there is a wide overlap with the recalculated "apparent consumption" in 1972-6, see Table 2. Rough estimates calculated from Lai's (1983) figures show that retained fins in 1982 were between 2 389 and 2 581 tonnes, also in the same neighbourhood. When we take into consideration the fact that in the early seventies the population was slightly over 4 million, while in the mid-nineties it was slightly over 6 million, shark fin traders may have something to think about.

When we calculate the average consumption of dry fins for the period 1993-6 we get a figure of 387g per Hong Kong person per year (annual average retained fins of 2 367 tonnes divided by average population of 6 111 750). This figure is for dried fins, and can be compared with the figure calculated for the seventies, which was 495g. This shortfall of 108g per person per year in dry fins could be compensated for by improvements in processing efficiency and other technological advances over the 20 years, so perhaps the average consumer does not notice any difference in the amount of shark fin in his bowl.

But this figure has not taken into consideration the increase in tourist arrivals. In 1976 it was 1.6 million and it has risen steadily to 11.7 million in 1996. Hong Kong has a well-deserved reputation as a haven for Chinese food and at least the Asians among the tourists will enjoy a bowl of shark fin soup. The results in Table 6 are surprising because Hong Kong has prospered and we expect to see more shark fin eaten, even if there is restraint because of the price. What we actually see is possibly a conspicuous restraint on consumption, possibly because that bowl of shark fin is actually meant for special occasions among the Chinese.

Marriage is one such occasion. In 1976 there were 9 marriages per 1 000 persons (Census & Statistics Department). The population then was 4 444 000 which gives 39 996 marriages. In 1986 there were 8 marriages per 1 000 persons. The population was then 5 525 000 so there were 44 200 marriages. By 1996, when the population went up to 6 311 000, the marriage rate was 6 per 1 000, or 37 866 marriages. So the number of marriage banquets has decreased in the nineties, and the Chinese are a frugal people at heart.

Above all, this figure does not take into consideration the special trading relationship which Hong Kong has cultivated with China. This may have a significant influence on the consumption of shark fin in Hong Kong by reducing its availability to Hong Kong and thus driving up the price. Kreuzer & Ahmed (1978) found that between 1972 and 1976 Hong Kong re-exported less than 10 % of shark fin it imported. They did not record any exports of shark fin to China, although fins were imported in small quantities from China. However, by the nineties, China had become Hong Kong's leading partner in the shark fin trade. In 1995 China exported 1 713 tonnes of dried fins to Hong Kong, approximately 28 % of total imports. In the same year China imported 3 302 tonnes of dried fins from Hong Kong, which constituted about 91 % of all Hong Kong's re-exports.

One of the attractions posed by China is a waiver of customs duties on shark fin sent from Hong Kong to China, provided that 30-50 % of the original weight is returned to Hong Kong. In 1995, when 1 713 tonnes of processed fins were returned to Hong Kong for the 3 302 tonnes imported from there, the percentage seems to satisfy the condition quite neatly.

There are approximately 300 traders who deal in shark fin and other seafoods in Hong Kong. In 1997 about half of them already have established processing plants in China. The plants are there because labour costs are about 35 % of those in Hong Kong, among other reasons. Processing is labour intensive, with practically no mechanised equipment, because of the huge variability in the shape, size and other characteristics of the fins.

Parry-Jones (1996 Appendix 2:13) observed that the percentage of re-exports of dry fins to China (in the same condition as imported) increased from just 11 % in 1980 to 91 % in 1995. In 1996 dry fins re-exported from Hong Kong amounted to 3 548 tonnes, of which 3 198 tonnes, approximately 90 %, went to China (Census & Statistics Department). China is probably a net importer of shark fin for its own consumption. The trading connection with China clearly has to be investigated further. It may be one of the reasons for the hefty price increase in fins.

What is alarming is that the retained fins, or presumed consumption in Hong Kong, appears to be decreasing from year to year. This is good news for the conservationists and imitation shark fin manufacturers. As an aside, Premier Vincent Siew of Taiwan Province of China decreed (The Sunday Times, 5 Oct, '97) on 1 Oct 97 that, in an effort to protect wildlife, no shark fin would be served at dinners hosted by him.

Traders all over the world are protective of their secrets and Hong Kong traders are no different. While they have been consistent in reporting volumes fairly accurately, they have never commented on the accuracy of declared values. They may also have changed their processing methods, resulting in increased volume of fin needles, without the consumer ever noticing it.

3.2 Prices

The cost of that delicious bowl of shark fin soup has increased everywhere in the world. Kreuzer & Ahmed (1978) reported that the average price of imported shark fins from 1972 to 1976 moved within the range of HK\$15.19/kg in 1975 and HK\$30.01/kg in 1976. They remarked that both wholesale and retail prices of dried fins changed frequently. This report therefore pools figures for several years together to dampen these variations for a better understanding of the Hong Kong trade. The average cost of imported shark fin between 1972 and 1976 was HK\$22.5/kg (HK\$259 678 000 divided by 11 537 tonnes). The value in 1982 was HK\$89.37/kg (Lai, 1983). Between 1993 and 1997 the range in prices of imported dry fins had risen to between HK\$282/kg and HK\$314/kg (Table 8). The average price of imported fins between 1993 and 1996 was HK\$295.3/kg (HK\$6 528 million divided by 22 108 tonnes). The average price of imports in 1982 therefore increased approximately fourfold when compared to the seventies and the average increase between the seventies and nineties was about 13 times.

On this information alone it is readily understandable that the cost of a bowl of shark fin in Hong Kong should have gone up many times over. The prices in lower range Chinese restaurants in September 1997 were about

HK\$70 per person portion; for mid-range restaurants it was about HK\$100 and for top range restaurants and hotels it could range from HK\$200-300 per person serving (Man, 1997). Since Man started working in hotels in Hong Kong, he noticed the rise in prices from twenty years ago when the Furama Hotel served shark fin soup at about HK\$20 per person. He himself, as a middle-income wage earner, eats shark fin soup about 4-5 times a year, but mainly at wedding banquets. Parry-Jones (1996) cited US\$90 as the upper end of the range, which may also have been for dining at super top-class restaurants/hotels.

The price by itself will not deter the Hong Kong person from his one or two bowls of shark fin soup a year served at banquets. One prominent trader said that it was not an item which can be substituted, such as a vegetable dish. All Hong Kong persons said they did not expect the eating of shark fin to stop; it will continue to be served at banquets, even if the price continued increasing. It has something to do with "giving face to one's guests", even though the actual amount of shark fin in the bowl may have to be thinned out to adjust the cost to one's pocket. It is also perceived as a food which promotes one's health and is of value in the Chinese's world-view. Hence even the poor in Hong Kong will pay and bear it, but only at banquets for special occasions. Man (loc cit) also provided a rough rule of thumb for the bowl of shark fin in the budget allocation; up to about one fifth of the cost of the total cost of the food. For example, for a table (10-12 persons) of about HK\$3,500, he mentioned that the cost of the shark fin soup would be around HK\$500-600, and for a table of between HK\$5,000-6,000, the soup would be about HK\$1,200. These are probably near to threshold costs.

Hong Kong persons of tertiary education and varying conservationist tendencies explained that a wedding or birthday banquet is expected to serve shark fin soup; it is not an item which can be taken lightly in Hong Kong. One such person in his mid-twenties who studied in an Australian university explained it this way when he was asked whether he would include shark fin in the menu of his children's wedding banquet. He said that so long as sharks are not proven to be endangered, he would. I expect that the consumption of shark fin over the next 25 years is likely to remain at between two and four banquets per year, depending on the zodiac sign. Of course, the rich can afford to eat it more than once a week if they so chose.

A shark fin dealer, who now runs the family business begun by his father, estimated that banquets consumed between two to three times the amount of shark fin eaten at business entertainment, i.e. approximately 70-25%. He added that there was a drift towards the business entertainment component, i.e. a move towards approximately 65:30%. Less formal family gatherings and cook-at-homes only took in about 5% of the total Hong Kong sales.

This was difficult to understand because of the large number of retail outlets along Des Voeux Road, Wing Lok Street, Ko Shing Street, Bonham Strand West area, where the dried seafood retail outlets congregate. The retailers also revealed that, in addition to sales to Hong Kong households, their target was tourists. They were clearly concerned that the disturbances in the exchange rates of Southeast Asian countries in Aug/Sep 97 would affect their sales.

Other factors also show why cost was increasing. Kreuzer & Ahmed (1978) observed that the cost of shark fin re-exported from Hong Kong in the form that they were imported, without further processing, ranged between HK\$29.37/kg in 1972 and HK\$46.08/kg in 1976. As the average import price was HK\$22.5/kg in the early seventies, this demonstrates the astuteness of the Hong Kong trader in making a profit from shark fin.

Between 1993 and 1997 the prices of re-exported dry fins ranged from HK\$109/kg in 1994/5 to HK\$139/kg in 1997 (Jan to Jun), while prices of imports averaged HK\$295.3/kg. The Hong Kong trader is still astute, if not more so, in making a profit in the nineties even if these figures seemed to hide that ability. They were however generally coy about their methods, and moved quickly to other topics by saying they were in a difficult business.

One of the ways was to sort the fins imported into Hong Kong in order to retain the more expensive ones for local processing, and despatching the cheaper varieties elsewhere. The more expensive fins, processed by more costly but more skilled workers in Hong Kong, ensures that the local restaurants have the best quality fins, for which a higher charge would apply.

Then there is the special trading link with China. Fins began their rush between Hong Kong and China in the mid-eighties. In December, 1984 The Joint Declaration was signed: Hong Kong would be a Special Administrative Region of China in 1997 for the next 50 years. It will have its own government and enjoy a high degree of autonomy under the principle of "one country, two systems". Companies began positioning themselves to advantage under the system. Not only were businesses expanded from Hong Kong into China, but Chinese companies also began to take root in Hong Kong. Traders say that fins go to China to seek out cheaper processing costs.

Table 7 Average prices of imported dry fins from the world, China and Singapore

| Origin of Imports | Item | 1993 | 1994 | 1995 | 1996 | 1997 (Jan-Jun) | Total and Average |
|-------------------|----------------------|-------|-------|-------|-------|-------------------|-------------------|
| World | Volume (tonnes) | 4 755 | 5 235 | 6 122 | 5 996 | 3 035 | 25 143 |
| | Value (HK\$ million) | 1 416 | 1 479 | 1 923 | 1 710 | 867 | 7 395 |
| | HK\$/kg | 297.8 | 282.5 | 314.1 | 285.2 | 285.7 | 294.1 |
| China | Volume (tonnes) | 1 034 | 1 208 | 1 712 | 1 946 | 977 | 6 877 |
| | Value (HK\$ million) | 169 | 195 | 330 | 384 | 164 | 1 242 |
| | HK\$/kg | 163.4 | 161.4 | 192.8 | 197.3 | 167.9 | 180.6 |
| Singapore | Volume (tonnes) | 551 | 698 | 579 | 412 | 183 | 2 423 |
| | Value (HK\$ million) | 165 | 212 | 228 | 137 | 72 | 814 |
| | HK\$/kg | 299.5 | 303.7 | 393.8 | 332.5 | 393.4 | 335.9 |

Source: Import volume and value are abridged from Census & Statistics Department

The average unit price of dry fins imported from China is lower than the average for total imports while imports from Singapore are higher than average in price. Import volumes from China in corresponding years exceeded those from Singapore by between 2 and 5 times and the value of China's imports was almost 3 times Singapore's in 1996. Both the volume and value of imports from China into Hong Kong increased from 1993 to 1997.

Table 8 Average prices of re-exported dry fins to the world, China and Singapore

| Destination | Item | 1993 | 1994 | 1995 | 1996 | Total and Average |
|------------------|----------------------|-------|-------|-------|-------|-------------------|
| World | Volume (tonnes) | 2 419 | 2 979 | 3 642 | 3 548 | 12 588 |
| | Value (HK\$ million) | 309 | 331 | 420 | 484 | 1 544 |
| | HK\$/kg | 127.7 | 111.1 | 115.3 | 136.4 | 122.6 |
| China | Volume (tonnes) | 2 077 | 2 664 | 3 302 | 3 198 | 11 241 |
| | Value (HK\$ million) | 159 | 201 | 274 | 309 | 943 |
| | HK\$/kg | 76.5 | 75.45 | 83.0 | 96.6 | 83.9 |
| Singapore | Volume (tonnes) | 137 | 105 | 131 | 135 | 508 |
| | Value (HK\$ million) | 43 | 34 | 45 | 55 | 177 |
| | HK\$/kg | 313.9 | 323.8 | 343.5 | 407.4 | 348.4 |

Source: Volume and value abridged from Census & Statistics Department

Hong Kong's re-exports to China are cheaper than the average of all its re-exports. Its re-exports between 1993 and 1996 to Singapore were 4 times as expensive as those sent to China (Table 8). The percentage of Hong Kong's re-exports to China also grew to 90 % of all of Hong Kong's re-exports in 1996 (Table 8).

The volume of re-exports to China is larger than the imports from China (Tables 7 and 8). In 1995 the volume of imports from China was about 52 % of Hong Kong's re-exports to China. Moreover, the unit value of fins imported from China is higher than re-exports to that country. This is in contrast with its trade with Singapore, which showed a higher unit value in re-exported fins in 3 out of 4 years. Other tables below also show that many of the fins are returned to Hong Kong after processing in China. Parry-Jones (1996) discussed in detail the special provisions between Hong Kong and China to make this worthwhile.

Intermediate priced fins (ie. between import and re-export prices) are sent to China as domestic exports (Table 9). These are probably sold to China to capitalize on the appeal of Hong Kong to the Chinese market. The price for domestic exports to China in 1996 (Table 9) is not a typing error, but I know of no explanation. The average price for domestic exports worldwide (HK\$5/kg 261.5), however, was lower than for imported dry fins shown in Table 7 (HK\$5/kg 294.1).

Table 9 Average prices of domestic exports of dry fins (kg and HK\$ 1 000)

| Destination | Item | 1993 | 1994 | 1995 | 1996 | Total and Average |
|-------------|----------|--------|--------|---------|--------|-------------------|
| World | Volume | 11 266 | 29 903 | 28 970 | 12 422 | 82 561 |
| | Value | 2 393 | 8 750 | 8 702 | 1 745 | 21 590 |
| | HK\$5/kg | 212.4 | 292.6 | 300.4 | 140.5 | 261.5 |
| China | Volume | 8 156 | 23 895 | 24 336 | 10 560 | 66 947 |
| | Value | 1 079 | 3 730 | 2 535 | 621 | 7 965 |
| | HK\$5/kg | 132.3 | 156.1 | 104.2 | 58.8 | 119.0 |
| Singapore | Volume | 1 600 | 2 749 | 1 696 | 840 | 6 885 |
| | Value | 629 | 2 209 | 4 202 | 364 | 7 404 |
| | HK\$5/kg | 393.1 | 803.6 | 2 477.6 | 433.3 | 1 075.5 |

Source: Census & Statistics Department

The volume of domestic exports is generally low in comparison with other exports. There do not seem to be any perceptible long-term trends either. However, the exports to China are again cheaper than the world average and very much cheaper than those to Singapore. The exports to Singapore in 1995 were just about the most expensive fins! The most expensive in 1995 were, in fact, dry fins (not listed as processed): 1 154kg were sold to Democratic Republic of Korea at HK\$3 037/kg. The North Koreans seem to make a habit of importing the most expensive dry fins because in 1993 they imported 30kg at HK\$3 200/kg and in 1996 60kg was imported from Hong Kong for HK\$7 633/kg.

Using Kreuzer & Ahmed's figures for such processed (ie, domestic export) fins, export prices ranged from HK\$56.27/kg in 1976 to HK\$137.22/kg in 1973, with an average of HK\$84/kg (HK\$4 538 000 divided by 54 tonnes) over the five years. Between 1993 and 1996 the processed fins were exported at between HK\$140.5/kg in 1996 and HK\$300.4/kg in 1995, with an average of HK\$261.5/kg; more than tripling in 20 years.

A brief examination of the trade in wet fins follows.

Table 10 Average prices of wet fins imported into Hong Kong

| Origin | Item | 1993 | 1994 | 1995 | 1996 | Total and Average |
|-----------|----------------------|-------|-------|-------|-------|-------------------|
| World | Volume (tonnes) | 537 | 469 | 1 187 | 1 849 | 4 042 |
| | Value (HK\$ million) | 48 | 37 | 100 | 149 | 334 |
| | HK\$/kg | 89.4 | 78.9 | 84.2 | 80.6 | 82.6 |
| China | Volume (tonnes) | 64 | 41 | 72 | 46 | 223 |
| | Value (HK\$ million) | 8 | 5 | 7 | 4 | 24 |
| | HK\$/kg | 125.0 | 121.9 | 97.2 | 87.0 | 107.6 |
| Singapore | Volume (tonnes) | 85 | 35 | 296 | 114 | 530 |
| | Value (HK\$ million) | 9 | 4 | 23 | 8 | 44 |
| | HK\$/kg | 105.9 | 114.3 | 77.7 | 70.2 | 83.0 |

Source: Abridged from Census & Statistics Department

The price of imported wet fins from China is higher than the world average and higher than prices of imports from Singapore. The average price of dry fin imports was HK\$294.1/kg (Table 7) and, compared to the price of wet fins, HK\$82.6/kg (Table 10), the former are about 3.56 times more expensive. We may recall that a trader gave 14:50 as his pricing ratio for wet to dry fins which is 3.57 times and compares quite well.

The retail prices of wet fins in September 1997, just before the Lantern Festival, along Des Voeux Road West in Central ranged from HK\$280 to HK\$380/kati for prepared fins (see Section 7) to HK\$480/kati for fin needles. These last-mentioned fins may be regarded as approaching "convenience" foods, in that they may take up to 3 hours to cook, while previously, starting with unprocessed fins, it could have taken much longer, perhaps days.

Table 11 Average prices of wet fins re-exported from Hong Kong

| Destination | Item | 1993 | 1994 | 1995 | 1996 | Total and Average |
|-------------|----------------------|-------|-------|-------|-------|-------------------|
| World | Volume (tonnes) | 284 | 394 | 905 | 1 783 | 3 366 |
| | Value (HK\$ million) | 40 | 37 | 74 | 135 | 286 |
| | HK\$/kg | 140.8 | 93.9 | 81.8 | 75.7 | 85.0 |
| China | Volume (tonnes) | 253 | 300 | 722 | 1 599 | 2 874 |
| | Value (HK\$ million) | 24 | 16 | 40 | 102 | 182 |
| | HK\$/kg | 94.9 | 53.3 | 55.4 | 63.8 | 63.3 |
| Singapore | Volume (tonnes) | 17 | 28 | 45 | 31 | 121 |
| | Value (HK\$ million) | 7 | 11 | 13 | 12 | 43 |
| | HK\$/kg | 411.8 | 392.9 | 288.9 | 387.1 | 355.4 |

Source: Abridged from Census & Statistics Department

Table 11 shows the re-export of wet fins from Hong Kong to China and Singapore. The cost per kilogram of re-exports to Singapore were much higher than the average to the rest of the world, and very much more than the prices to China. The re-exports to China cost less than the imports of wet fins from China (Table 10), confirming that they had undergone processing in China before they were returned to Hong Kong.

Table 12 Average prices of domestic exports of wet fins

| Destination | Item | 1993 | 1994 | 1995 | 1996 | Total and Average |
|-------------|--------------------|--------|--------|--------|--------|-------------------|
| World | Volume (kilograms) | 18 957 | 17 731 | 10 621 | 11 033 | 58 342 |
| | Value (HK\$ 1 000) | 8 834 | 6 942 | 4 808 | 4 680 | 25 264 |
| | HK\$/kg | 466.0 | 391.5 | 452.7 | 424.2 | 433.0 |
| China | Volume (kilograms) | 6 736 | 7 941 | 2 943 | 1 120 | 18 740 |
| | Value (HK\$ 1 000) | 2 404 | 1 650 | 389 | 152 | 4 595 |
| | HK\$/kg | 356.9 | 207.8 | 132.2 | 135.7 | 245.2 |
| Singapore | Not available | | | | | |

Source: Census & Statistics Department

The volume of wet fins declared as domestic exports (ie, processed in Hong Kong) is again small (Table 12). However, the average unit price of these exports is high, much higher than the average dry fins processed in Hong Kong (Table 9). Once again, the price of these exports to China is below world average. The type of products so exported was not recorded in the official statistics. Although these hydrated fins fetched a lot of money, they probably also cost a lot to process in Hong Kong. However, the volume and possibly the total value of these exports appear to be on the decline. The export of these fins to China showed a decline from year to year, with the value decreasing from HK\$2.4million in 1993 to only HK\$152 000 in 1996. Republic of Korea imported 7 340kg of Hong Kong's total domestic exports in 1995, or almost 70 % of it, and may be expected to invite their Hong Kong counterparts to rationalize their processing activities.

The Census and Statistics Department's records also provided some light-hearted distractions in this study. We saw the fins with the highest prices earlier on; the lowest were also recorded. Indonesia, Thailand and Brunei bought the cheapest fins during 1993-6. Indonesia bought 2 600kg of unprocessed dry fins at HK14.6/kg in 1993. Thailand bought unprocessed wet fins in 1994 and 1996 for HK\$9.4/kg (27 400kg) and HK\$25.1/kg (100 611kg) respectively. Brunei imported unprocessed wet fins in 1995 at HK\$26.5/kg (2 720kg). Thailand has become a major fish processing country, with its capture of the top position in the export of canned tuna. The relatively large amount of imports suggests that it could be preparing itself for fairly large-scale re-processing of shark fin as part of its overall fisheries development.

4 OTHER SHARK PRODUCTS AND COOKERY

Products from shark liver and cartilage are found in most, if not all, Chinese and western pharmacies in Hong Kong. Shark liver oil capsules are imported from Australia, Canada, China and the USA. The retail prices of Australian, Canadian and American squalene products were between HK\$100 and HK\$440 per bottle of 60 to 100 capsules, while the Chinese product from Guangzhou was at HK\$200 for a bottle of 80 capsules. Parry-Jones (1996) found that 1995 prices were much higher; the prices may have dipped because of competition and a healthy scepticism among consumers.

The livers of sharks landed in Hong Kong are not harvested for industrial use. They are probably discarded with the viscera when the sharks are cleaned for their fins and meat.

Shark cartilage products were imported only from Australia and the USA; no products from China were displayed. The Australian product was sold at HK\$60 for a bottle of 30 capsules, while the American bottle of 90 capsules was sold for HK\$480. Like the oil capsules, prices have gone down.

Shark cartilage used to be discarded after the fin needles were processed but recent publicity on the yet unproven curative properties of the shark has resulted in their retention in various forms for sale in the dry seafoods market area around Des Voeux Road West. These cartilaginous platelets are sold at about HK\$38/kati (see Section 7).

Hong Kong imports a small amount of spinal bones. Some shops sold it at about HK\$68/kati (see Section 7).

Hong Kong traders are not yet fully agreed on how cartilage products are processed. One of the traders made the following observation. He noted that Japan has imported the cartilage of blue shark from Hong Kong for the past 20 years, so he boiled cartilage from various sharks for about 3 hours and found that the blue shark cartilage almost completely disintegrated into a broth, unlike that from other sharks. One of his aged relatives has found the brew, flavoured with ginger and salt, and optionally with chicken, pork ribs or frog jelly, to have reduced the aches and pains in her joints. The trader who let me in on the family secret however insisted that cartilage from other than blue sharks are not as efficacious because they have much less gelatinous material. He believed the cartilaginous platelets and spinal/caudal columns have dubious health value.

Sharkskin is not made into leather in Hong Kong. However some of it is processed and eaten in certain restaurants and food outlets. There is no separate entry in the Hong Kong statistics records, probably because it is traded in such small quantities, and in the SEAFDEC records Hong Kong did not report either its import or export. Between 1991 and 1993, however, Taiwan Province of China and Indonesia recorded exports of fish and sharkskin (SEAFDEC). A trader said that Hong Kong imports small amounts of sharkskin at about HK\$20-30/kati; these are sold at HK\$50-60/kati (see Appendix 2, chapter 7), more than the price of shark fin cartilage. Although they are included in some dishes, they are not specifically named on the menu as an ingredient. One way of cooking was described to me by Lam (1997):

- Skin from the caudal fin is used; the skin there is thicker. It is soaked for 24 hours in tap water to remove smells and to soften the skin. Dermal denticles have already been removed by the fin processors, but the dry skin has heavy ash and fish smells. Change the water several times. When the skin is softened, soak it in hot water in which about half a kati of wild or old ginger has been boiled. Add about 100ml white rice wine and boil for 30 minutes then cover with a lid and let the mixture cool for about 2 hours. Rinse and soak in tap water for 2 hours after which the ash and fishy smells will have been removed.
- For nutritious soup, boil Chinese herbs with either pork ribs, chicken or abalone for 3 hours. Add in strips of prepared fish skin from the above for the last hour. Add salt to taste. This soup is believed to be good for the spleen, spine and joints, and is suitable for arthritis, as was believed also for cartilage.
- Alternatively, stir fry with mushrooms and other vegetables. Add soy sauce, oyster sauce, and chicken stock to taste; garnish with spring onion.

Ham should not be used for cooking sharkskin, whereas it is recommended for shark fin.

Lam (1997) also described his method for cooking processed whale shark fin. Soak the processed fin for 2-3 days in running water, or change the water several times. The hydrated fins are boiled in water whereupon the fin needles contract to about half their length. Simmer for 2 hours and let the water cool for 3-4 hours. Soak in tap water drip for 15 hours or more, after which any residual smell will be removed. Cook by stewing or simmering on a low flame or steaming with various ingredients for about a day to concentrate the soup and to heighten the taste of the fins. The size of the fin needles from the fin shown in the photo (Appendix 2, chapter 9) will then be about 5-6mm thick and 15cm long.

Hong Kong imports a small quantity of shark fin in cans and microwaveable packs, but does not produce it herself.

Phipps (1996) provided an abundance of references for shark fin cooking published in the Chinese language. For a first reference in the English language see Ng (1988).

5 SHARK FIN IDENTIFICATION

The shark fin trade in Hong Kong was built up carefully by pioneers and the business passed down from one generation to the next. About 70 % of the businesses are run by owners and the rest by partners. Today, the owners/partners would often personally inspect the fins in the country of export before flying back to open a letter of credit. Entrusting this role to their employees has sometimes resulted in business losses, not because they are not reliable, but because they do not have as complete a picture of the business as the boss. A tremendous amount of goodwill and trust is also encouraged between the business associates.

Among the traders themselves, there is an unwritten code of ethics by which they conduct their business and face up to each other. At their auction sessions, which are held regularly and on the premises of each trader in turn, they exchange information about the trade as well as inform on cheats, defaulters on payments, and other matters. Where credit is extended but not honoured, pressure to settle is exerted by their peers. However, it

appears that they do not actively exchange information regarding their dealings with overseas business associates.

The association does not organize training courses; one of the reasons is that the traders train their own staff through a system of apprenticeship. This is best exemplified in a father and son relationship. The training in this case is as complete as possible and practically nothing is written down. This is seldom, if ever, shared among the community.

There is no established system for naming shark fin among the Chinese. This is probably not very different from practices in other languages. Chen (1996) and Parry-Jones (1996), writing on the trade in Taiwan Province of China and Hong Kong respectively, carefully avoided using Chinese names. In some cases in Hong Kong, Singapore, and Taiwan Province of China, for example, although the traders use Chinese as a common language they may call the same fins by different names and different fins, which look similar, by the same name. Although they write in the same script, speaking different Chinese dialects probably confuses rather than simplifies matters. Mr Koh (1997), a Singaporean fin trader and processor who also produces fins in cans, felt only slightly uncomfortable when he said he did not know what were the names used by his Hong Kong counterparts for various fins. They name the fins according to their shape, size, colour, texture and the location on the body of the shark. However, the names given may not be related to the sharks from which they are taken, since they may have never seen the shark. Not only have no "keys" been developed but it appears that they may in fact not be welcome since it would disrupt a seemingly authoritarian system.

The publication by Yeong, Lam & Cbew (1994) ran into 6 reprints within 2 years. One of the authors informed me that the book was being revised and is expected to be released soon (Lam, 1997) which is a good start. The publication represents the current status of shark fin identification among the traders in Hong Kong. They do not all call the same fin by the same name as yet and explain this by saying that they need to focus on the market value of the fins rather than their names. A list (Appendix 2, chapter 8) is compiled from the book to show the probable current status of fin identification among the traders. It includes fins with problem names. The list is not complete but it represents a start on sorting out an old problem. Lam confides he can identify 42 fins, further splitting these down to dorsals, pectorals and caudals. Some traders can manage 38 and the rest concentrate on just half that many to make a good living.

To hone his expertise in fin identification, Lam has a collection of fins, which he painstakingly displayed for the photographs shown in this report. The writer appreciated the time and information Lam willingly shared. The photos include a shot with Lam and his processed whale shark dorsal fin. The names of the fins have been checked by him (Appendix 2, chapter 9). In order to identify the sharks from which the fins are taken, from a scientific point of view, it will be necessary to use other methods.

DNA techniques have been used to make unambiguous identification of 9 shark species (Woodley and others, 1994). The study was prompted by the increased demand for shark fin and meat and the establishment of a shark management programme in the US Exclusive Economic Zone of the Atlantic Ocean, Gulf of Mexico and the Caribbean Sea. The authors commented on the difficulties of accurate species identifications, citing morphological similarities of shark species, loss of diagnostic characteristics by finning, heading and gutting practices, and tissue samples (dried fins and blood) that are not amenable to routine diagnostics by iso-electric focusing. Since the identification of sharks by experts is so complicated, it is understandable that the identification from dried fins back to shark species may be just as difficult, if not more so.

More recent work by Heist (1997) on 11 carcharhinidae confirmed that DNA techniques can be used with confidence on the identification of shark species. He further believed that, although he used meat samples, there was no reason why the techniques he used could not apply equally well on fin needles.

In order to identify the sharks from which fins in Hong Kong are derived, it will be necessary to compile a list of names in Chinese. This will have to be agreed by traders in Hong Kong and other countries as a first step. Meanwhile, positively identified fins will have to be harvested from sharks and preserved to match the list of Chinese names. It is anticipated that at least a year's work will be needed but it is necessary to bring order to a complicated trade, even if that may reduce its mystique a little.

In the meantime, imitation shark fin has been produced from animal and plant materials. They have been used somewhat fraudulently and have not established themselves as an alternative in the way that imitation crab sticks have for real crab. Perhaps manufacturers should re-think their marketing strategy since traders in Hong Kong

believe imitations are as good as rejected. This is rather surprising since Chinese vegetarians like to prepare their food to imitate meat products in both appearance and taste, such as vegetarian duck, vegetarian pork and so on.

Marketing in Singapore is straightforward and the imitation articles can be sold as such but there must be no attempt to deceive the consumer by slick advertising or labelling. The vegetarian shark fin is made from the extract of mung bean, the green gram, which is a widely cultivated tropical legume. In fact, mung bean extract is traditionally made into a transparent thin noodle which is eaten quite widely in Southeast Asia, and in Hong Kong is called *fun st*. Liu (1997) said that imitation vegetarian shark fin is quite popular in Taiwan Province of China.

Chew and co-workers (1992) in Singapore, investigated what they believed to be imitation shark fin of animal origin. They referred to the process for producing analogues using mixtures of gelatines and gums which were coagulated by divalent or trivalent metal salt solutions which was patented by Kammuri, Nagahisa and Kamikawa (1990). They subjected samples to microscopic examination, solubility in water and potassium hydroxide (KOH) solution, spectroscopy and hydroxyproline content. They found that imitation fins do not have any fibrous structure like the real fin needles, but instead have characteristic transparent homogenous appearance. Real fins under x40 magnification show connective tissue fibres uniformly arranged in parallel and aligned with the lengthways axis of the fin needles.

Both real and imitation fins are insoluble in water. Boiling at 100°C for 3 hours, and autoclaving at 10 psi/115°C for 30 minutes did not change their microscopic appearances.

When they were soaked in 10 % KOH at 25°C for 3 hrs, the genuine fin needles disintegrated and dissolved. The membranous attachments to the needles took a little more time to dissolve, and occasionally cloudy precipitates formed on standing, but they quickly dispersed on gentle shaking. The five imitation products they examined remained intact even after 30 days in KOH at room temperature. Changes observed were slight swelling of the needles, a softening of texture, and a loss of yellow coloration into the solution. Under the microscope the needles showed numerous vacuoles consistent with swelling.

The extracts from soaking in 10 % KOH for 3 hrs at 25°C showed different spectrophotometric profiles. Real shark fin showed 3 peaks at 292nm*, 240nm and one between 220-230nm. The solution from the imitation fins soaked for 3 hours in 10 % KOH showed only a single peak at 220-230nm. The blank 10 % KOH solution also had an absorption peak at between 220-230nm. Boiling the real and imitation needles resulted in dissolution of the former and four out of five of the latter. Nevertheless, their absorption spectra remained unchanged. The authors believed that the absorption mixture at 240 and 292 coincided with that of tyrosine in alkaline conditions; shark fin contains a high proportion of this amino acid.

They also found that hydroxyproline was not a suitable test for imitation shark fin because the test itself was time-consuming and manufacturers could easily switch to a gelatine derived from fish to mask the fact that the product was an imitation.

Authentication tests are still provided by the Singapore authorities but the laboratory has not been engaged to provide this service for several years. This is because imitation fins appear to be pitted against a haloed article. Besides, armed with a simple chemistry set and microscope, a schoolchild can tell the difference between the fins.

* nanometres

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7 PHOTOGRAPHS OF SHARKS AND SHARK PRODUCTS

The following photographs show sharks and shark products for sale in Singapore and Hong Kong.



Photograph 1

Display of shark fin and other choice seafoods in a restaurant in Hong Kong.



Photograph 2

Dish of ray wings cooked in chilli and salted vegetables with garnishings in a Singapore hawker centre



Photograph 3

Plain steamed meat of small sharks, displayed for sale in a Singapore hawker centre.



Photograph 4

Small sharks and rays at Punggol Fish Market, Singapore (Since these photos were taken the wholesale market has been re-located.)



Photograph 5

Assorted sharks sold at Castle Peak Fishing Port, Hong Kong.



Photograph 6

Processed dry pectoral fins displayed in a shop on Wing Lok Street. The air bladders shown between the fins are more expensive than the fins together.



Photograph 7

More processed dry fins of assorted sizes and prices displayed for sale inside a shop in Hong Kong (Prices in HK\$/kati)



Photograph 8

Dry shark fin nests.



Photograph 9

Convenience packs of wet shark fin nests displayed for sale in Hong Kong (Prices in HK\$/pack)



Photograph 10

Prepared wet shark fin nests displayed as medium and large sizes for sale outside a shop in Hong Kong (Prices in HK\$ /kati)



Photograph 11

More prepared wet shark fin nests displayed as medium and large sizes for sale outside a shop in Hong Kong (Prices in HK\$ /kati)



Photograph 12

Prepared wet fin needles displayed for sale at HK\$480/kati outside a shop in Hong Kong



Photograph 13

Dry fin cartilage for sale at HK\$38/kati



Photograph 14

Dry spinal columns of sharks for sale at HK\$68/kati. Dry fin cartilage are displayed beside them for sale at HK\$38/kati

8 CHINESE NAMES FOR SHARK FINS

This section has been compiled from "The complete book of dried seafood & foodstuffs" by Yeong Wei Xiong, Lam Cheung Chi, Chew Biu Yeong

| HANYU PINYIN OF SHARK FIN | CHINESE NAME OF SHARK FIN | SCIENTIFIC NAME OF SHARK | COMMON NAME OF SHARK |
|------------------------------|------------------------------|-----------------------------|----------------------------|
| NA WEI TIANJU CHI | 挪威天九翅 | CETORHINUS MAXIMUS | BASKING SHARK |
| NIUPI TIANJU CHI | 牛皮天九翅 | RHINODON TYPUS | WHALE SHARK |
| HUANG JIAO CHI | 黄胶翅 | - | - |
| SHA QING CHI | 沙青翅 | - | - |
| BAI QING CHI | 白青翅 | CARCHARHINUS PLUMBUS | WHITE SANDBAR SHARK |
| HAI HU CHI | 海虎翅 | - | - |
| GU YI CHI | 骨翼翅 | - | - |
| SHU GU CHI | 疏骨翅 | - | - |
| WU YANG CHI | 五羊翅 | - | BROWN SHARK |
| LIU QIU CHI | 琉球翅 | - | - |
| HEI WEI QING CHI | 黑尾青翅 | - | - |
| CHUN CHI | 春翅 | SPHYRNA ZYGAENA | COMMON HAMMERHEAD SHARK |
| SHA PO CHI | 沙婆翅 | - | - |
| SHA GONG CHI | 沙公翅 | - | - |
| HU DIE QING CHI | 蝴蝶青翅 | - | LEMON SHARK |
| YA JIAN CHI | 牙拣翅 | - | - |
| TIAN SHI CHI | 天使翅 | - | ANGEL SHARK |
| BAI CHAN CHI | 白蝉翅 | - | - |
| QING LIAN CHI | 青莲翅 | ISURUS OXYRINCHUS | MAKO SHARK |
| MI GU CHI | 密骨翅 | - | - |
| NIUPI SHA CHI | 牛皮鲨翅 | - | - |
| MOPAN SHA CHI | 磨盘鲨翅 | - | - |

| HANYU PINYIN OF SHARK FIN | CHINESE NAME OF SHARK FIN | SCIENTIFIC NAME OF SHARK | COMMON NAME OF SHARK |
|---------------------------|---------------------------|--------------------------|------------------------|
| HEI SHA CHI | 黑沙翅 | - | - |
| ZHU SHA CHI | 竹筴翅 | - | - |
| YOU CHI | 油翅 | - | DOGFISH |
| HUA SHA JIN QIAN GU | 滑沙金钱骨 | SCYLIORHINUS CANICULA | LESSER SPOTTED DOGFISH |
| CAO SHA JIN QIAN GU | 糙沙金钱骨 | SCYLIORHINUS STELLARIS | LARGE SPOTTED DOGFISH |

In addition to the above:

1. Group of fins under the same "family" name:

| | | | |
|-------------------|---------|--------------------------|--|
| QUN CHI | 群翅(a) | RHYNCHOBATUS DJIDDE-NSIS | (GIANT GUTTAR FISH in Chinese translation) |
| | 群翅(a) | RHINOBATUS HYNNICEPHALUS | (SHOVELNOSE RAY in Chinese translation) |
| HUANG SHA QUN CHI | 黄沙群翅(b) | - | - |
| ZHEN ZHU QUN CHI | 珍珠群翅(b) | - | - |
| HUANG QUN CHI | 黄群翅(b) | - | - |
| MIAN QUN CHI | 棉群翅(b) | - | - |
| RUAN SHA QUN CHI | 软沙群翅(b) | - | - |

2. Fins from the same shark, but called different names by Hong Kong dealers:

| | | | |
|------------------|-----|---|---|
| RUAN SHA CHI | 软沙翅 | - | - |
| DA WANG CHI | 大王翅 | - | - |
| (alternate name) | | | |
| SHAN CHI | 扇翅 | - | - |
| ER CHI | 耳翅 | - | - |
| (alternate name) | | | |

Footnotes

(a) These two fins bear the family name only, and refer to fins from different sharks.

(b) Fins from different sharks called under same family name, but also bear specific names.

The above Chinese names, scientific names and common names of sharks are reproduced from the book. The Hanyu Pinyin names are provided by Mr. Lim Chee Hong for the convenience of non-Chinese readers.

9 LIST OF PHOTOGRAPHS OF SHARK FINS

The names in this section were given by Mr Lam

| PHOTO NO. | CHINESE NAME OF SHARKSPIN | HANYU PINYIN SHARKSPIN NAME | COMMON NAME OF SHARK | REMARKS |
|-----------|---------------------------|-----------------------------|------------------------------|------------------------------|
| 1 | 黄胶翅 | HUANG LAO CHI | - | 1P, 1C, processed fins |
| 2 | 黄胶翅 | HUANG LAO CHI | - | 1P, 1C |
| 3 | 扇翅 | SHAN CHI | - | 2P |
| 4 | 油翅 | YOU CHI | - | 4P |
| 5 | 沙公翅 | SHA GONG CHI | - | 2P, 1C |
| 6 | 珍珠群翅 | ZHEN ZHU QUN CHI | - | 2D |
| 7 | 蝴蝶青翅 | HU DIE QING CHI | LEMON SHARK | 2P, 1D |
| 8 | 软沙翅 | RUAN SHA CHI | - | 2P |
| 9 | 黑尾青翅 | HEI WEI QING CHI | BLACK TIP SHARK | 2P, 1D |
| 10 | 疏骨翅 | SHU GU CHI | PINK SHARK | 2P, 1D |
| 11 | 牙抹翅 | YA LAN CHI | BLUE SHARK | 2P, 1D, 1C, full set |
| 12 | 春勾翅 | CHUN GOU CHI | COMMON HAMMERHEAD | 2P, 1D, 1C, full set |
| 13 | 五羊翅 | WU YANG CHI | BROWN SHARK | 2P, 1D, 1C, full set |
| 14 | 天九翅 | TIANJIU CHI | BASKING SHARK | 1D, 1C |
| 15 | 白青翅 | BAI QING CHI | WHITE SANDBAR SHARK | 2P, 1D, 1C, full set |
| 16 | 白鲸翅 | BAI JIAN CHI | - | 4P |
| 17 | 骨翼翅 | HU YI CHI | GREAT HAMMERHEAD SHARK | 2P, 1C |
| 18 | 海虎翅 | HAI HU CHI | TIGER SHARK | 2P |
| 19 | 青化翅 | QING HUA CHI | THRESHER SHARK | 1D |
| 20 | 白青翅 | BAI QING CHI | WHITE SANDBAR SHARK | 2P, 1D |
| 21 | 琉球翅 | LIU QIU CHI | YELLOW TIP BROWN SHARK | 2P, 1D, 1C, full set |
| 22 | 青蓬翅 | QING LIAN CHI | MAKO SHARK | 2P, 1D, 1C, full set |
| 23 | 竹鲨翅 | ZHU SHA CHI | BAMBOO SHARK | 2P |
| 24 | 硬壳青蓬翅 | YING KE QING LIAN CHI | - | 2P |
| 25 | 密骨翅 | MI GU CHI | FOX SHARK | 1P |
| 26 | 琉球翅 | LIU QIU CHI | YELLOW TIP BROWN SHARK | 1C, with caudal skin samples |
| 27 | 牛皮鲨翅 | NIU PI SHA CHI | BULL SHARK | 1P |
| 28 | 糙沙金钱骨 | CAO SHA JINQIAN GU | - | 2P, 1D |
| 29 | 滑沙金钱骨 | HUA SHA JINQIAN GU | - | 2P |
| 30 | 天使翅 | TIAN SHI CHI | ANGEL SHARK | 1C |
| 31 | 春翅 | CHUN CHI | A SPECIE OF HAMMERHEAD SHARK | 2P, 1D |
| 32 | 磨盘鲨翅 | MOPAN SHA | - | 4P |
| 33 | 沙婆翅 | SHA PO CHI | NURSE SHARK | 2P, 1D |
| 34 | 抽翅 | YOU CHI | DOG FISH | 2P, 1C |
| 35 | 北欧天九翅 | BEI OU TIAN JIU CHI | BASKING SHARK | 1D, 1C |
| 36 | 沙公翅 | SHA GONG CHI | DOG FISH | 2P, 1D |
| 37* | 牛皮天九翅 | NIU PI TIAN JIU CHI | WHALE SHARK | 1D, processed fin |

* Mr Lam Cheung Chi on the left.

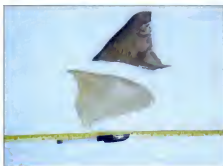
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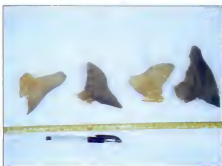
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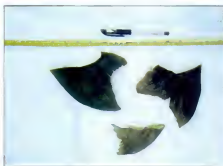
Photograph 3



Photograph 4



Photograph 5



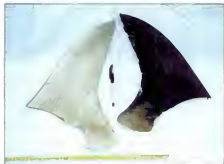
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Photograph 7



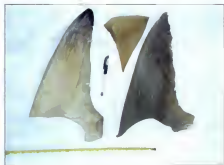
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Photograph 9



Photograph 10



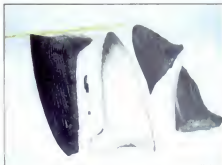
Photograph 11



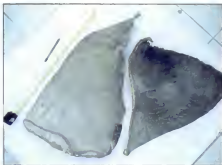
Photograph 12



Photograph 13



Photograph 14



Photograph 15



Photograph 16



Photograph 17



Photograph 18



Photograph 19



Photograph 20



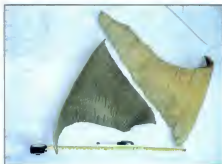
Photograph 21



Photograph 22



Photograph 23



Photograph 24



Photograph 25



Photograph 26



Photograph 27



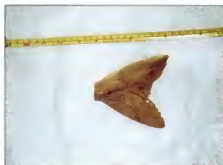
Photograph 28



Photograph 29



Photograph 30



Photograph 31



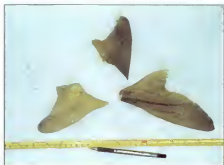
Photograph 32



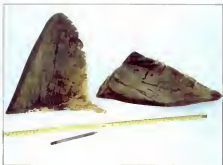
Photograph 33



Photograph 34



Photograph 35



Photograph 36



Photograph 37



APPENDIX IV.2

SHARK PRODUCT MARKETS IN SINGAPORE AND MALAYSIA

by SEI POH CHEN

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1 INTRODUCTION

In Singapore and Malaysia, shark meat has long been a part of the diet of the population. Dog shark (*Scoliodon sorrakowah*) is reported to be of commercial importance (LKDM). Of shark products, the best known is undoubtedly shark fin. Another traditionally consumed product is shark lips, a glamorized name given to the skin taken from the upper lobe of the shark's tail.

In recent years, the steady increase in the price of shark fin has created an awareness of the value of the product. Consequently, the cartilaginous platelet, a waste product from shark fin processing, is now being sold as a soup base with a health food connotation. It is reported to be good for the relief of head, back and shoulder aches brought on by osteoporosis in the elderly.

Squalene and shark cartilage imported from Japan, New Zealand and the USA are sold in health food shops (Chen Hin Keong ed.)

In view of the fact that the quantity of shark products, other than fins, are either too small or too commercially unimportant to be reported by the Singaporean and Malaysian Statistics Department, the bulk of this report will concentrate on shark fin.

It is necessary to mention that during the time of this report the currencies of Malaysia and, to a lesser extent, that of Singapore, went through a very difficult period. The prices of shark fin are only indicative as, in addition to the huge fluctuations in exchange rates, traders are reluctant to disclose this information. The indicative exchange rate for conversion to US\$ during this period would be around US\$1=SS\$1.5, US\$1=Rm3 and SS\$1=Rm2.

2 SHARK FIN

2.1 Background information

2.1.1 The fins on sharks

Most species of sharks have at least two sets of median fins situated along the central line of the body. There are one or two dorsal fins on the top, a caudal fin, which is the tail, and an anal fin located at the underside behind the anus. Most sharks have triangular dorsal fins. There are usually two, the first being generally larger than the second, but in some species there is only one. The caudal fin is asymmetrical with the vertebral column extending into the upper lobe. The anal fin is not present in all species. Its absence or presence is important in shark classification. They also have two sets of paired fins on the underside of the body. These are the pectoral fins just behind and, in some cases, partly below the gill slits and the pelvic fins located at about the midpoint of the underside of the body. As with all the fins in sharks, the pectoral fins cannot be folded back and are consequently erect all the time.

Of the 350 or more species of sharks, less than 50 species have fins of commercial importance. The fins are mostly imported in the dried form, complete with denticles and cartilaginous platelets. The trade commonly calls these the raw fins.

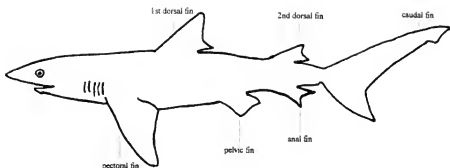


Figure 1 Fins on the shark

2.1.2 The structure

A shark fin has very little muscle tissue. There is a membrane, and in some cases a fatty layer under the skin, covering a bundle of collagen fibres spread out like a fan. In most fins these fibres are supported by a cartilaginous platelet in the centre. The cartilaginous platelet is absent in the caudal fin.

Sharks do not have scales. The skin of the fins, like that of the rest of the shark's body, is covered with large numbers of usually very small thorn-like structures or denticles. These make sharkskin feel like sandpaper.

The collagen fibres of the fin are rounded at the base, tapering to fine points at their extremities, giving the appearance of needles. Appropriately, they are commonly known as fin needles. Separately or joined as a bundle, the fin needles will eventually find their way in different preparations onto the dining table

2.1.3 The chemical composition

Nutritionally, the composition of 100 g of dried sharks' fin needles is as follows.

| | |
|--------------|---------|
| Water | 14.0g |
| Protein* | 83.5g |
| Fat | 0.3g |
| Carbohydrate | 0.0g |
| Ash | 2.2g |
| Fibre | 0.0g |
| Iron | 15.2mg |
| Calcium | 146.0mg |
| Phosphorus | 194.0mg |
| Food energy | 337kcal |

Source: Food Composition Tables, People's Health Publication, Beijing

* The protein of shark fin lacks the essential amino acid Tryptophan.

2.1.4 The traditional background

Shark fin as a food was reported in writings of the Ming Dynasty (1368 -1644). It has therefore been known in China for at least a few hundred years. Throughout the ages, the Chinese have considered shark fin one of the eight treasured foods from the sea. The fact that so little is obtained from such a large fish made fins noble and precious, fit for the tables of the emperors. Fins were indeed listed as articles of tribute when officers of coastal regions visited the emperors in the Imperial court. (Yang, Lin and Zhou)

Fins are traditionally served at dinner parties to express the host's respect for his guests. To this day the practice still holds true in Chinese communities. They are most frequently consumed on auspicious occasions, such as weddings.

2.1.5 The health benefits

The benefits of shark fin as documented by old Chinese medical books include the following: rejuvenation, appetite enhancement, nourishing to blood, beneficial to vital energy, kidneys, lungs, bones and many other parts of the body.

The more traditional person will swear to the benefits as claimed. On a radio show when the owner of a shark fin restaurant was asked about the health benefits of shark fin, he claimed that he consumed it daily and thus maintained his youthful appearance. An elderly shark fin trader reasoned that, since fins have had long years of exercise in the sea, there is no doubt that they are good for the bones and muscles of the consumer.

However, there seems to be an increasing number of people who question the claimed benefits of fins. They are of the opinion that fins are over priced and over rated. Their main purpose as luxury products is to satisfy the vanity of those who can afford them.

Most consumers note the bland taste of fin needles, which need to be cooked with various tasty ingredients to acquire any flavour. Few commented on the transparency of the fin needles, which make the food appealing to the eye.

2.2 Factors affecting trade

2.2.1 The criteria for value

Commercially, the factors affecting the value of the fins are:

1. The percentage yield of fin needles. From an economic standpoint, the fin that yields a higher percentage of fin needles is better value for money. The yield in turn is governed by a number of factors:
 - The type of fin, e.g. the lower lobe of the caudal fin has no cartilaginous platelet, therefore, compared to other types of fins, this has the highest percentage yield of fin needles. The upper lobe of most species does not yield fin needles so, after removal of the denticles, the skin is dried and sold as fish lips. The variations in sizes of fin needles are vast. Generally, the larger the fin, the longer and thicker are the fin needles. The caudal fin by comparison is the largest fin of the fish, therefore yields the thickest and longest fin needles, followed by the first dorsal fin and then the pair of pectoral fins. The fin needles from the second dorsal fin, the pair of ventral fins and anal fin are considered to be of much lower quality.
 - The species, e.g. the whole caudal fin of the shovel Nose Ray yields fin needles from both the lower and upper lobe. The fin needles of Basking shark are reputed to be as thick as a chopstick while fin needles from some fins are finer than hair.
 - The processing methods employed, e.g. whether the fin is clean cut or has shark meat attached, whether it is light and dry or been salted and thus has a high moisture content. The trade in general is weary of ageing fins. In such cases, certain parts of the fin lose their natural elastic property and acquire a hard bony structure, which is not palatable. Unfortunately, ageing in the fin is not easily detected when dry, i.e. at time of purchase. When the ageing becomes visible after rehydration it has to be discarded. It is reported that this phenomenon is more common in species inhabiting tropical waters, as the environment makes the sharks age faster. (Yang, Lin and Zhao).

2. The general appearance A good fin product would be clean cut, with no meat or other undesirable attachments at the cut edge. The surface of the washed fins should be a whitish yellow. Generally, when the fin needles are connected in a bundle and/or are long and thick, they would present a greater visual and sensual impact to the diner, thus commanding a higher price than the shorter and finer ones.
3. The texture: The connoisseur often demands a specific fin for its texture, usually tenderness. In such cases this criteria takes precedent over length or thickness. The very thick fin needles from very large fins have a tendency to be tough.

2.2.2 The quality of supply

Some countries are able to produce better quality sharks fins than others. They are usually those with a developed fishery, having adequate infrastructure and post harvest technology. This enables the fins to be kept fresh and clean and unsalted before drying. The producing countries which fall into this group include the Americas, Japan, Australia, Mexico and Spain. Of these, Mexico and Australia provide the best value for money.

Countries around the Indian Ocean are more traditional in their shark fin processing methods and, combined with the lack of infrastructure, the fishermen and processors of these countries are more inclined to use salt for preservation. This results in inferior products with high moisture content. These countries are also resistant to change with a philosophy that as long as the products sell there is no reason to change. An exception in this group, according to an importer, is Sri Lanka, which adheres to tradition yet is able to produce a good product.

2.2.3 Methods of consignment

Importers purchase shark fin in various different ways, depending very much on how the suppliers sort the fins. Some sort the fins into three categories as follows:

- First grade fins, i.e. the white fins, in sets of three, which consist of two dorsal fins and a caudal fin. The sets are of the same species and the same sizes are packed together. The size in this case is determined by the length of the first dorsal fin.
- Second grade fins, i.e. the black fins, graded by species and size. If sold in sets, the size referred to would be that of the pectoral fin.
- Second grade bottom fins; anal and pelvic fins of mixed species and sizes.

Others sell in 1-2 tonne lots, mixing species and sizes. Using this method, importers report losses of 2-3kg of choice fins of choice species per lot.

2.2.4 Nomenclature

The international trade customarily classifies fins into white and black groups. Some traders say that this is a description of the colour of the fins, others that it is a classification by their yield and taste and a third version maintains that shark fins of the white group belong to sharks from shallow waters while the black belong to sharks from deeper waters. The former have a set of three fins, two dorsal and a caudal fin, whereas the latter have a set of four, a pair of pectorals, a dorsal and a caudal fin.

All agreed however that fins of the white group give higher percentage of fin needles and a better flavour. These are more sought after and thus command higher prices. Fins from the black group are inferior in both percentage yield and flavour. The classification is used in the trade the world over but there are other differences in opinion. For instance, the fins of Tiger sharks are considered to be white by one Indian authority and black by another. (See section 6)

Within Singapore and Malaysia traditional names are also used, often following those used in Hong Kong but not always. A number of names were also created by some traders, mainly to confuse buyers so that the latter would have difficulty duplicating the order from another supplier.

2.2.5 Identification of species

Most larger traders of shark fin know exactly what they are dealing with. They can tell by looking at a raw fin its position on the shark, its trade name and its country of origin. Not many know the common or scientific names of the sharks but, with the existing knowledge of the product, it seems highly likely that the species could be

identified if traced back to the source of supply. The identification of species from fin needles is extremely difficult except, perhaps, for some large fin needles.

The smaller traders are usually vague on the background of their shark fins. As for the restaurant trade, it is claimed that not many know about fins in relation to the properties of the various species. The priority of most restaurants is the price of the fins. They usually stay with what they know and seldom tread into unknown territory. When change is inevitable, they normally take the advice of their suppliers.

2.3 Processing of "raw" fins

This is the process that renders the fin needles of the dried shark fin soft and ready for cooking. The resultant fins are termed wet fin and those that are not required for immediate use are often re-dried or frozen. The re-dried fins are called cooked fins. The steps involved in the processing of raw fins are as follows:

2.3.1 Removal of the denticles

Depending on the size, thickness and species of the fin, this process involves soaking the fins in water varying from lukewarm to 60°C. Some need to be repeatedly heated over a slow fire for up to five hours. When the skin and the denticles are sufficiently soft to work with, the denticles are removed by scratching with a small knife or wire brush.



Photograph 1.1 Removing denticles from sharkskin

2.3.2 Removal of the cartilaginous platelet

The fin is cut from the broad edge to loosen the fin needles on either side of the cartilaginous platelet, taking care not to cut open the fan shape, so that the fin still remains in a joined piece after the platelet is removed.

2.3.3 Trimming

Fins are trimmed to remove any undesirable waste material and to give it a tidy appearance. (Photograph 1.2) The fins at this stage are ready for the market as wet fins. They can also be frozen or re-dried for later use.

2.3.4 Bleaching

The fins are usually bleached to give them a desirable whitish colour. The methods include smoking with sulphur overnight (Liu, Li and Niu) or treatment with 3 % hydrogen peroxide for about 30 minutes (Subashingha).



Photograph 1.2 Trimming a fin

2.4 Products in the market

2.4.1 Dried

- "Raw" fins are complete with skin and cartilaginous platelet, where present. Their colours vary with the species, but are generally grey black, light brown or yellowish. The denticles on the skin make the surface rough to the touch. These are usually found in importers, wholesalers and sometimes in retail outlets. (Photograph 1.3)



Photograph 1.3 "Raw" fins

- "Cooked" fins have the denticles and the cartilaginous platelet removed. They are yellowish white in appearance and the surface is smooth to the touch. These are sold in wholesalers and retailers outlets.(Photograph 1.4)



Photograph 1.4 "Cooked" fins

- Fin needles, dried in random arrangements or in rows. These products are usually not prepared from choice fins. They are found in wholesalers and retailers outlets. (Photographs 4.4 and 4.5)

2.4.2 Ready to cook products

- Wet fins are rehydrated ready to cook fin needles. They are sold in supermarkets and retail outlets for the restaurant and the home consumer. Some processors add sodium carbonate to the soak water to accelerate the rehydration process and increase the rate of water absorption by over 250 %. Using established processing methods, one kilogram of raw fin yields 0.75 to 1.5kg of wet fins, the cleaner the cut of the raw fin, the higher the yield. The addition of sodium carbonate will yield 4kg of wet fins from 1kg of raw fins. Wet fins processed this way look plump and juicy but shrunk once heat is applied. Sodium carbonate is generally used only in the rehydration of more robust fishery products such as dried cuttle fish and octopus, because it removes fatty materials from the product and may affect its nutritional values. (Wang Zhe Yue)
- Frozen fins - Fin bundles are frozen ready for use. These are usually sold in retail outlets to home consumers. (Photograph 4.6)
- Powdered shark fin soup, ready to cook, sold in retail outlets. (Photograph 4.7)

2.4.3 Ready to eat products

- Canned and pouched products of various fin preparations are sold in retail outlets. Most are products of Singapore and Thailand. (Photographs 4.8 and 4.9)
- Sashimi and sushis are sold in selected supermarkets. The fins used are usually of Japanese origin. (Photograph 4.10)

2.4.4 Artificial shark fin

This is a Japanese product with the appearance and, to some extent, the texture of shark fin. Because of its looks and its comparatively very low price, some restaurants use it instead of shark fin with or without the knowledge of the consumer. To make the dishes more authentic, the restaurants usually mix artificial fins in with shark fin in a 30/70 ratio. It is probably most used at wedding dinners, where the respect for the dinner guests is upheld with the presence of fins, and the respect for the hosts' finances is taken care of by lower costs.

A trained person can easily tell the difference between the artificial fins and the shark fin. Generally, the artificial fins are less elastic, break more easily and do not withstand heat as well as the real thing. It is not so easy for the untrained to know the difference, especially since most diners' experience of shark fin is rather limited. The price of artificial fins is Rm30/kg.

The Singapore Government has closed restaurants that tried to pass the artificial fins off as the real thing. The Malaysian Government allows its use by restaurants as long as it is sold as artificial fins.

2.5 Availability of supply

A small number of traders have experienced a general decrease in the supply of shark fin. One importer in particular informed me that the quantities offered by his suppliers have reduced tenfold since the 1950s. Most other traders have yet to experience any shortage. However, some observed an increase in smaller size fins. This could be the result either of more smaller sharks being caught or of an improvement in processing technology to handle smaller size fins.

Some observed that increasing pollution and higher water temperature has driven many sea inhabitants such as *bêche-de-mer*, to deeper cooler waters. They reason that, in the same way, sharks may also become less available to those fishermen without appropriate fishing gears to meet changing conditions.

Most are optimistic that the sharks will be in the seas for many years to come. Those familiar with fisheries in developing countries argued that management of resources are governed by economic forces. The shark fishermen, in their effort to safeguard their livelihood, do not find it economically viable to fish in one area for too long. After some time they move to another area and do not return to the same area for several years. In

many developing countries, fishing sharks for fins is just as much fishing sharks for meat; it is a necessity in the hunt for food and income.

On the other hand, conservationists reported that at least 50 000 blue sharks landed by long line fishermen are tossed back in the water after their fins are removed. The numbers of some shark species may have plummeted by 80 % over the last decade. (Michael D. Lemonick, Time)

The only thing that everyone is sure of is that prices of shark fin will only increase. As societies become more affluent and traditional ethnic food products, such as shark fin, become better known world-wide, the demand for them will increase. Against the back drop of meeting increasing demands, more sharks will be fished and the price of shark fin will continue to rise.

3 SINGAPORE AND MALAYSIA: TRADE IN SHARK PRODUCTS

3.1 Singapore

3.1.1 General

Singapore is the second largest shark fin trading nation after Hong Kong. Traders who have been involved in Singapore's shark fin trade for forty to fifty years remember the time when eight to ten auctions were held daily. During that time, only members of the Singapore Shark fin Merchants Association were able to purchase shark fin. They also remember the ready availability of an inexpensive supply. However, since 1987, with the entry of China into the market, prices have increased by 100 % over the 10 years; about 10 % per annum. This was interrupted for 4-5 months in 1989, after the unrest in China following the student demonstrations in Beijing.

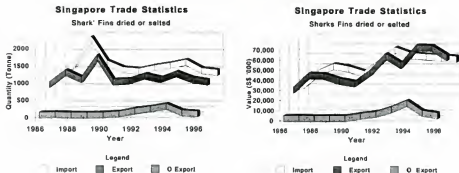
It is interesting to note that the opening up of the Chinese market also saw an increase in demand for the fins of whale sharks. These fins were not usually popular products as their fin needles are inclined to be coarse in texture and ashy in taste. The Chinese demand for these fins were not for food, but mainly for display in the restaurants. The sheer size of these fins was enough to impress customers. After a surge in purchases for 4-5 years, the demand has died down since 1996. It is reported that Indian suppliers were left with 30 tonnes of surplus stock. They have great difficulties in finding buyers even at the price of S\$10/kg. The normal price per kilogram is S\$40. A set of whale shark fins consists of one dorsal, one caudal and a pair of pectoral fins weighing between 10 and 15kg. Singaporean and Malaysian restaurants are also very fond of displaying shark fins on their premises. (Photograph 2.3)

In Singapore it is not difficult to collect information on trade statistics and traders. The Trade Development Board of Singapore has a vast collection of trade information. The Singapore Productivity and Standards Board was also extremely helpful. The Primary Production Department would have been the best source for an unbiased picture. Unfortunately, contact with the personnel of the Department was not established.

3.1.2 Trade

Tables 1 and 2 and Figures 2 and 3 show the quantity and value of imports, exports and domestic exports of shark fin products between 1986 and 1996. Domestic exports refer to exports originating from Singapore and comprise primary commodities produced in Singapore and goods which have been manufactured, assembled or processed there, even if they include imported materials.

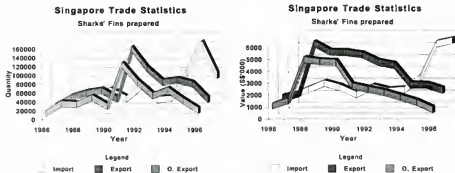
Figure 2 Singapore trade in dried or salted shark fin



Imports of dried or salted shark fin peaked in 1988 at 1 899 tonnes and exports peaked in 1989 at 1 525 tonnes. 1988 saw exceptionally high imports from Malaysia, 705 tonnes, but this was only worth S\$41 000, giving an average value of only S\$58.16/tonne. This is anomalous as the annual average value per tonne during this period ranged from S\$24 743 to S\$53 677 except for 1998 when it dropped to S\$21 460/tonne. The value of imports was highest in 1992 and of both exports and domestic exports in 1994. From Figure 2 it appears that, while the quantity of imports has remained fairly steady in recent years, the value per unit is generally rising.

Figure 3 shows a general downward trend in the quantity and value of exports and domestic exports of prepared shark fin. While the quantity of imports appears to be dipping after the dramatic rise in 1995, its value continues to rise. Imports of prepared shark fin peaked in 1995 reaching 143.789 tonnes at S\$5.206 million. This gives an average price of S\$36.20/kg. The average annual price over this period was between S\$31 and S\$77/kg. Exports and domestic exports peaked in 1991 at 143.7 tonnes and 119.776 tonnes, at S\$4.746 million and S\$2.595 million respectively. The value of imports was highest in 1996 at S\$5.496 million for 71.23 tonnes giving an average of S\$77.15/kg. (Table 2)

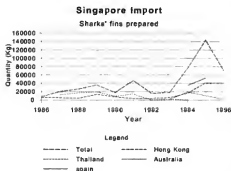
Figure 3 Singapore trade in prepared shark fin



Imports

There is no import tax on shark fin, only a 3 % sales tax.

Figure 4 Singapore imports of prepared shark fin



From 1986 to 1996 Singapore imported dried or salted shark fin from more than 75 countries. Of these, Hong Kong, India, Japan, Pakistan and Yemen were the major suppliers. The quantities imported from these five countries account for more than half the quantity imported and about half of the total cost. However, in recent years Japan and Pakistan seem to be declining and Spain, Sri Lanka and Taiwan Province of China are gaining. (Table 3).

Singapore imported prepared shark fin from more than 25 countries between 1986 and 1997. Imports from Hong Kong and Thailand were most consistent throughout. Australia started to gain in quantity only in the 1990s. The other remarkable imports were from Spain in 1994 and 1995 amounting to 35 136kg and 53 216kg, respectively. (Figure 4 and Table 4)

Exports

Singapore exported dried or salted shark fin to more than 25 countries (Table 5). Hong Kong was the single largest buyer. Its intake varied from 503 tonnes in 1990 to 1 314 tonnes in 1989, representing 62 % and 86 % of total exports respectively. The value of the intake by Hong Kong varied from S\$31.885 million in 1992 to S\$21.018 million in 1986 representing 56 % and 93 % of the total export value. Malaysia and Myanmar were, for most years, the second and third largest buyers. (Figure 5 and Table 5).

Figure 5 Singapore exports of dried/salted fins

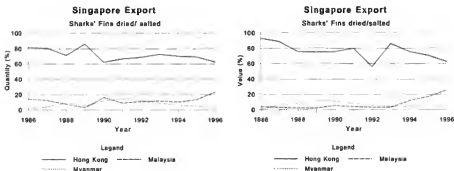


Figure 6 Singapore exports of prepared shark fin



Singapore exports prepared shark fin to more than 17 countries of which Hong Kong, Japan, Taiwan Province of China and the USA bought larger quantities during this period (Table 6 and Figure 6) All of these countries showed a downward trend after reaching a peak at varying times. Exports to Japan peaked in 1988 at 20 668kg. The USA was at a high of 22 073kg in 1987 and Taiwan Province of China peaked in 1991 with 52 464kg.

Domestic exports

Singapore exported dried or salted shark fin to more than 15 countries. The quantity was relatively small compared with regular exports. It varied from a low of 1 tonne valued at S\$51 000 in 1988 to a high of 254 tonnes worth S\$15.266 million in 1994. After that the trend was again downward. While Hong Kong was the major export market, Malaysia, Philippines and Thailand shared a large proportion of the remainder. (Table 7)

Singapore exported prepared shark fin to more than 16 countries on a more regular basis. The quantity varied from a low of 9 805kg at a value of S\$919 000 in 1986 to a high of 119 776kg at a value of S\$ 2.595 million in 1991. The major markets included Hong Kong, Japan, Taiwan Province of China, USA, France and Germany. (Table 8)

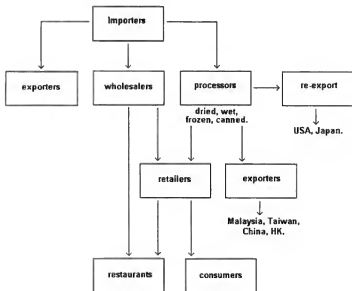
3.1.3 Changing trends and changing tastes

Busy modern living generates a need for ready-to-cook and ready-to-eat products. Increased affluence in society creates demands for higher valued products. This has prompted younger generations in the shark fin trade to embark on processing. This involvement has resulted in the merging of the previously distinct lines between importers, wholesalers and users further down the chain. The processors' need for a regular supply of raw material prompted them to purchase directly from source. This bypasses the auction, thus giving them not only lower prices by bulk purchasing but saving the 3-5 % auction fee. In so doing, they are taking on the role of importers. Having bought in bulk, they ended up with surplus shark fin they do not need, so they sell them in the local markets or overseas, and take on the role of wholesalers and exporters. In the early days most of the trade in shark fins was internal, nowadays 90 % of the trade has become external.

3.1.4 Distribution channels

As the role of each sector of the trade merge and overlap, the distribution channels listed below shows the flow of the product rather than the functions of each of the player involved.

Figure 7 Slopapore distribution channels



3.1.5 Popular species

Of the many species of fins imported into Singapore, two are most popular with the local restaurant trade. These are the fins of Brown shark and Blue shark. Species such as Hammerhead shark, Tiger shark, White Sandbar shark are also common. However, by comparison, they are used in very small quantities.

From time to time the preference for fins of specific species will change, mainly influenced by the culinary arts of visiting chefs from Thailand and Hong Kong. They also change when the consumers become more or less willing to pay. The canned shark fin trade uses small washed fins, 2-3 inches* long. These are probably of mixed species.

3.1.6 Indicative prices

Generally, the price range for white and black fins are as follows:

- White fins S\$40-150 per kg for sizes ranging from 6 inches to 20 inches. The measurement is that of the dorsal fin in the set of 3 fins. They are the first and second dorsal fins and the caudal fin.
- Black fins S\$10-60 per kg for sizes varying from 4 inches to 24 inches. The measurement is that for the pectoral fins in the set of four fins. They are the two pectoral fins, a dorsal fin and a caudal fin.

The actual price paid for each consignment is based on the quality of the fins, whether they are dried or salted-dried, the size range and the species.

* 1 inch=2.54cm

3.1.7 Singapore standards for shark fin

According to sources in the Singapore Productivity and Standards Board, there are no standards for the sale, import or export of shark fin in any form e.g. dried, canned or processed wet fins. The processing plants, however, have to meet the licensing authority's hygienic requirements.

A number of pre-packed dried shark products sold on the Singapore market are lacking in details on product description or even the net weight, e.g. dried fin needles. Many of the canned products are packed in poor quality, easily dented cans. The net weight and the contents of the cans are reported but the consumer has no way of knowing the weight of the fins in the can.

3.2 Malaysia

3.2.1 General

The shark fin trade in Malaysia is not well documented and information is difficult to obtain. Except for the customs statistics, Government Departments do not have specific information on shark fins or shark fin traders, even though imports must be licensed.

When traders are traced and approached, most are reluctant, to a point of secrecy, to discuss their trade. The shark fin processors in particular were spoken of in almost a whisper. This gave an extremely strong impression that the processors did not want their activities known by anyone outside the trade, especially the officers from the Inland Revenue. The task was made more difficult by the fact that most traders do not advertise their activities in the yellow pages of the telephone directories or in trade directories, be it for the food industry, the chamber of commerce or the dried seafood association.

Except for the sale of popular products such as shasimi and sushis in local supermarkets, (Photo 4.10) Malaysian shark fin processors have not ventured into processing of ready-to-eat products. However, attempts were made to produce canned shark fin soups. One established Malaysian company distributes pouched shark fin soups and dishes under its own label, but the product was processed and packed in Thailand. (Photograph 4.9)

The statistics for shark fin products, previously reported as shark fin dried, salted or in brine, was sub-divided in 1989 into two separate groups. One "Dried whether or not salted but not smoked" and the other "Salted but not dried or smoked and in brine". Although classifications for statistical purposes derived from the need to address large groups and types of fishery products, applying the grouping for shark fins is particularly clumsy. As only dried fins are traded in the region, the first group is in fact dried shark fin and the second group is salted and dried shark fin.

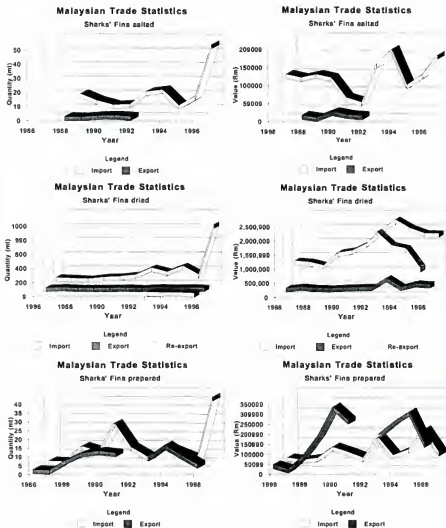
Starting in 1988, the item previously under the group "Shark fin prepared not in airtight containers" was simply renamed "Shark fin". This simplification no longer describes the product and may cause confusion.

3.2.2 Trade

The Malaysian trade in shark fin is on a much smaller scale than Singapore; only about 2% of that of Singapore. However, even with small quantities, it is nonetheless a moderately active market in all three shark fin items. Malaysia imports from more than 25 countries and exports to around 15.

Figure 8 shows the quantity and the value of shark fin products imported, exported and re-exported between 1986 and 1996. It is interesting to note that imports of all three products increased sharply in 1996. However their values showed that the unit price had become exceedingly low at Rm2 147, Rm3 548 and Rm1 375 per tonne, respectively. (Tables 9,10 &11)

Figure 8 Malaysian trade in shark fins



Imports

Before 1993 the Malaysian import tax on shark fin was 50 %. In 1993 this was reduced to 30 % and in the following year fell again to 20 % but importers were then required to pay another 5 % sales tax.

- "Shark fin dried whether or not salted but not smoked" Of the 25 countries Malaysia imported from during the period 1986-1996, Indonesia and Singapore provided the bulk. Indonesia's peaked in 1994 with 159.55 tonnes at a value of Rm912 760 and Singapore's were greatest in 1993 with 75.58 tonnes costing Rm1 224 307. A closer look at the huge increase in imports in 1996 reveals that, out of the total of 823.81 tonnes, 680 tonnes, which cost Rm6 917, came from the Maldives. If these figures are accurate, the unit price of the imports from Maldives was only Rm10.17 per tonne. An importer also pointed out that it was unlikely that Maldives had that kind of quantity. The unit price of imports varies greatly over this period, from Rm2 147/tonne in 1996 to Rm14 953/tonne in 1993. (Table 12)
- "Shark fin, salted but not dried or smoked and in brine" Malaysia imported this item from 13 countries. The quantity varied from 2.31 tonnes costing Rm68 398 in 1994 to 42.56 tonnes at Rm151 021 in 1996. These imports also came mainly from Indonesia and Singapore. Recently quantities have been imported from India and the Philippines. Again there were great fluctuations in the unit price, from Rm3 548/tonne in 1996 to Rm29 609/tonne in 1994. (Table 13)
- "Shark fin prepared" Malaysia imported this item from 12 countries. The quantity varied from 54kg at a price of Rm23 415 in 1987 to 37.24 tonnes costing Rm51 213 in 1996 - almost 70 times the quantity but only double the cost. The fluctuations in unit value were huge during this period, from Rm1 375/tonne in 1996 to Rm92 303/tonne in 1995. It is rather doubtful that this reflects the real market situation; possibly errors have occurred in recording the statistics. (Table 14)

Exports

- "Shark fin, dried whether or not salted but not smoked" Malaysia exported this item to 13 countries. The quantities varied from 13.67 tonnes at a value of Rm387 459 in 1993 to 1.2 tonnes priced at Rm12 268 in 1989. Singapore was the largest buyer with purchases varying from 11.47 tonnes at Rm56 516 in 1987 to 2kg costing 1 000 Malaysian ringgit in 1995. (Table 15)
- "Shark fin salted but not dried or smoked and in brine" Between 1986 and 1997 the largest quantity exported was only 1.45 tonnes at a value of Rm20 716 in 1994. (Table 16)
- "Shark fin prepared" The export quantity of this item varied from 0.7 tonnes at Rm29 800 in 1986 to 14.63 tonnes costing Rm244 498 in 1994. Malaysia exported this item to more than 15 countries. The Republic of Korea was the major market from 1994 but earlier the USA was the major buyer. (Table 17)

Re-exports

From 1993 the quantity of re-exported "shark fin dried whether or not salted but not smoked" were almost parallel to and in some years exceeded exports. The re-exported quantities of the other two shark product groups were almost non-existent. (Tables 9,10 &11)

3.2.3 Changing trends

Major changes have occurred as a result of the increase in the price of shark fins. Some Malaysian traders commented that, with such high prices, it is no longer worth while remaining in the trade.

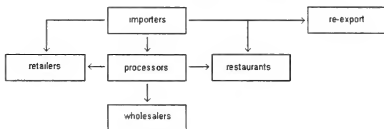
It is believed that traders who used to import to Malaysia are now turning more and more to buying from source and consigning shipments directly to buyers in other countries, mainly Hong Kong and Singapore. One of the reasons for this is that Malaysian buyers want comparatively small quantities and, probably because of a lack of outlets for their fins, tend to be more selective and want the lower lobes of the caudal fins. This results in breaking up fin sets. This creates a problem for the traders because the buyers in Hong Kong and Singapore prefer to buy the fins in sets, and current high prices make them more demanding. The easier way out for these Malaysian traders is to by-pass Malaysia, which also saves them the tax payment and handling charges. It is commonly believed that the values of the products are under-declared to Malaysian customs in any case.

The Malaysian traders started the shark fin processing industry about ten years ago. They mainly process the raw fins into ready-to-cook products, wet, re-dried or frozen. No instant soups or canned products are made in Malaysia.

3.2.4 Distribution channels

As in Singapore, many Malaysian shark fin traders have multiple roles. They are often importers, exporters, wholesalers, processors and retailers all at the same time. Some are also restaurant owners, cooking and serving the products they trade. However, the distribution channels can be illustrated as in Figure 9

Figure 9 Malaysian distribution channels



3.2.5 Popular species

The most well known and highly priced shark fin in Malaysia is the Shovel-nose Ray. The most popular is probably the Blue shark. Others often mentioned by traders are Blacktip shark, Sandbar shark and Hammerhead shark. It is believed that only three % of the restaurants in Malaysia have the knowledge to use different species and type of fins to their best advantage. The users, probably for the same reason, are conservative and do not experiment unless absolutely necessary.

3.2.6 Indicative prices

Some of the prices of fins traded in Malaysia are indicated below:

| Name | Product | Size (Inches) | Price (Rm) |
|-----------------|-------------|------------------------|------------|
| Basking shark | 4 piece set | pectoral fins 36-60 | 1 000/kg |
| Black tip shark | 4 piece set | pectoral fins 13 | 310/kg |
| Blue shark | 4 piece set | pectoral fins 18-30 | 190-250/kg |
| Brown shark | 3 piece set | pectoral fins 15 | 290/kg |
| Ryukyu shark | 4 piece set | dorsal 10, pectoral 13 | 220/kg |
| Sandbar shark | 4 piece set | - | 300/kg |
| Shovel Nose Ray | 3 piece set | pectoral fins 4-14 | 90-360/kg |
| Whale shark | 4 piece set | pectoral fins 36-48 | 7-800/set |

3.2.7 Malaysian standards for shark fin

The standards and Industrial Research Institute of Malaysia (SIRIM) stated that they have not set any standards for import, export or processing of shark fin products.

Except for the products sold in reputable outlets, very few of the dried shark fin products sold on the market, whether imported or locally processed, supply the consumer with information on unit price, net weights, etc.

4 COMPANIES TRADING IN SHARK PRODUCTS

4.1 Singapore companies

| | | |
|---|--|---|
| <p>Chia Huat Yong Kee Trading Pte Ltd 21 North Canal Road Singapore Tel: 65 533 4478/ 534 1656 Fax: 65 533 5431</p> | <p>Chup Tat Enterprise Co Blk 1036 Eunos Avenue 4 #01-52 Singapore 409790 Tel: 65 742 8609 Fax: 65 742 8630</p> | <p>Chin Guan Hong (Sharks/fin) Pte Ltd 17/18 North Canal Road Singapore 048830 Tel: 65 534 1096 (3 lines) Fax: 65 534 2985 Telex: 534 2985 Pager: 9507 4540 H/p: 9662 6091 Attn: Mr. Yio Kang Leng Director <i>Importer/exporter/wholesaler/ processor/retailer</i></p> |
| <p>Chip Chiang 28 Hong Kong Street Singapore 059667 Tel: 65 533 4745/535 8929/538 6248 Fax: 65 533 9923 Telex: HSEAGO RS 26255 Attn: Mr. Koh Yeow Lin <i>Importer/exporter/wholesaler/ processor/retailer</i></p> | <p>Choon Huat Pte Ltd 44 North Canal Road Singapore 059300 Tel: 65 533 4446 Fax: 65 533 2712</p> | <p>Chop Yong Huat 41 Hong Kong Street Singapore 059680 Tel: 65 533 7654/ 535 9392 Fax: 65 533 1866 Attn: Md Lau Meng Chiang</p> |
| <p>Expofin Pte Ltd 1 Sophia Road #24-02 Singapore Tel: 65 339 0780/1772/1773</p> | <p>Exec Enterprise Blk 3012 Bedok Industrial Park E #04 2030 Singapore 4989978 Tel: 65 448 7156 Fax: 65 448 9431</p> | <p>Food Marketing Services Pte Ltd 6 Defu Lane 2 Singapore Tel: 65 283 1321 Fax: 65 283 5220 Attn: Md Tan Yock Fong <i>Exporter/wholesaler</i></p> |
| <p>Golden Flag Trading Pte Ltd Blk 4005 Depot Lane #01-91 Singapore 109759 Tel: 65 273 3104 Fax: 65 273 8709 Attn: Mr Ho Lee Chong Mr Ho Kui Huat <i>Exporter/processor (shork fin soup)</i></p> | <p>Guan Sang Co Pte Ltd 32 North Canal Road Singapore Tel: 65 536 6108/535 7176/ 532 6688/2488</p> | <p>Guang Soon Seng 19 North Canal Road Singapore Tel: 65 533 4136 <i>Importer/exporter</i></p> |
| <p>Hiap Heng Chng (S) Pte Ltd 5/6 North Canal Road Singapore 048818 Tel: 65 535 1888 (4 Lines) Fax: 65 535 7283 Telex: RS 25106 FIBEACH Cable: FINBEACH Attn: Mr Michael Poon <i>Importer/exporter/processor/retailer</i></p> | <p>IFE Trading Pte Ltd 1123 Serangoon Road #03-02 UMW Building Singapore 328207 Tel: 65 295 8307 Fax: 65 295 8309 Attn: Mr Noon Mojdehi</p> | <p>Jack Mae Food Trading Pte Ltd 19 Lor Telok Singapore 8049031 Tel: 65 533 3820 Fax: 65 538 6627</p> |
| <p>Joo Hong Marine Trading Pte Ltd Blk 1021 Woodlands Industrial Park D#01-126 Singapore Tel: 65 365 1245/ 8791 Fax: 65 365 6571 <i>Processor</i></p> | <p>Jyoti Co #05-12 Blk 122 Richfield Ind Centre Eunos Avenue 7 Singapore 409575 Tel: 65 742 4844 Fax: 65 842 4844 Attn: Mr Sundip Parikh <i>Importer/exporter/wholesaler</i></p> | <p>Kai-Ocean Pte Ltd 28 Tuas Avenue 12 Singapore 639043 Tel: 65 863 0801 Fax: 65 863 0767 Attn: Mr Raymond Lim, Mr Philip Lee, Mr Harry Lee (Directors) <i>Importer/exporter/wholesaler/ processor</i></p> |
| <p>Kenly (Impex) Trading Enterprise 31 Fishery Port Road, Unit 01-13/14 Jurong Town Singapore 619741 Tel: 65 261 1906/ 225 6322 Fax: 65 787 7810/ 224 6490 Attn: Mr Tan Kim Hua Mr Ke Jim Hwai <i>Importer/exporter</i></p> | <p>Kim Hing Food Industries 60 South Bridge Road #01-04 Fook Hai Bldg Singapore 058690 Tel: 65 538 2288 Fax: 65 533 7446 Attn: Mr Norman Tan <i>Importer/exporter/processor/ retailer-(canned shork fin)</i></p> | <p>Kwang Yeow Heng 30 Hong Kong Street Singapore 059667 Tel: 65 533 8830/535 2173/278 0471 Fax: 65 532 4141</p> |

| | | |
|--|--|--|
| Mui Lian Shark fin Co Blk 12 Hougang Avenue 7 #01-471/473/477 Singapore 538797 Tel: 65 284 7162/280 9227/0811 Fax: 65 281 1097 Attn: Mr Yu Kim Hoy, Mr Alan Yu <i>Importer/exporter/wholesaler/ processor</i> | P W M Enterprise 25 Pandan Loop, Singapore Tel: 65 776 2095/ 4386 Fax: 65 776 5637 | Royal Fin exporters 64 Waterloo Street #014-01 Singapore 187959 Tel: 65 339 6846 Fax: 65 336 5490 |
| Sck Hong Trading Company 24 Liu Fang Road (Jurong) Singapore 628676 Tel: 65 266 4117/266 6220 Fax: 65 266 6207 Pager: 9707 2242 H/P: 9736 5123 Attn: Mr Peter Lim, Manager <i>Importer/exporter</i> | Seng Hong Co (Pte) Ltd 8 Hong Kong Street, Singapore Tel: 65 535 4888 Fax: 65 535 7325 Attn: Mr Cheng Tsang Man <i>Importer/exporter</i> | Seng Long Enterprise Pte. Ltd 31 Carpenter Street, Singapore Tel: 65 533 6560 Fax: 65 534 3803 Attn: Mr Chia Wee Chung <i>Importer/exporter/wholesaler</i> |
| Shun Chin Trading Co 15 Tangling Halt Close Tangling Halt Industrial Estate Singapore 148854 Tel: 65 476 8977 Fax: 65 473 7555 / 5 475 2570 Attn: Mr Patrick Lim, Mr Peter Koh <i>Processing/trading</i> | Sharkfins Trading 6001 Beach Road #B1-77 Singapore Tel: 65 299 4706/297 2439 | Sin Huak Trading 8 Opal Crescent Singapore Tel: 65 299 2395/2413 Fax: 65 299 2449/284 0705 |
| SINEUROPE Pte Ltd 73B Amoy Street Singapore 069892 Tel: 65 244 5700/227 2240 Fax: 65 225 1508 Attn: Mr Melvin Foo <i>Importer/export/wholesaler</i> | Sun Kee (Private) Limited 36 Jalan Kilang Barat Singapore 159366 Tel: 65 273 2260 (5 lines) Fax: 65 273 6122 E-mail: sunkee@pacifite.net.sg HTTP://WWW.Sunkee.com Attn: Mr George LY Lim, MD Mr Bobby AL Tan <i>Importer/retailer</i> | Tong Kee Trading Blk 113 Bukit Merah View #01-548 Singapore 150113 Tel: 65 270 5480 Fax: 65 270 5670 Attn: Ms Vivian Thng, Ms Thng Bee Lay, Mr Thng Choo Tong <i>Importer/exporter/wholesaler/retailer</i> |
| Unigreat Resources Pte Ltd Blk 16 Wholesale Centre #01-99 Singapore 110016 Tel: 65 776 0906 Fax: 65 779 4239 Attn: Mr David Lim, Md Low Liling, Directors <i>Importer/exporter</i> | Uniross Traditional Trading Blk 149 Petir Road #03-196 Tel: 65 362 2122/ 766 2122 | Wealthy Seafood Product & Enterprise Blk 10 1 2 Aljunied Avenue 3 #01-33 Singapore Tel: 65 841 3533 Fax: 65 841 3522 Attn: Mr Tan Ee Tiong <i>Importer/exporter/distributor</i> |
| Yau Shing (Frozen Sharkfin) Pte Ltd 42 North Canal Road Singapore 059298 Tel: 65 533 0229 Fax: 65 535 1874 Attn: Mr. Poon Wee Hue <i>Importer/exporter</i> | Yeo Ah Chye Blk 19 Defu lane 10 #01-304 Singapore Tel: 65 284 6852/280 4640 Fax: 65 280 3487 | Yeow Seng (Sharkfin) Pte Ltd Blk 2 Tew Chew Street #01-304 Singapore 050002 Tel: 65 532 5139/535 1979 Fax: 65 533 5351 Telex: RS 55071 YFOSEN Cable: "YEOW SEAFIN" Attn: Mr. William Goh, MD <i>Import/exporter/wholesaler/processor</i> |

In Singapore the Primary Production Department licenses 1695 importers of fish and fishery products but the information is not for general distribution. The names and addresses shown in the above list are extracted from various sources including the following:

- "Singapore Exporters" the official export directory of the Singapore Trade Development Board
- The yellow pages of the 1997 Singapore Telephone Directory
- "Catch On" A publication of the Seafood Industries Association – 1995
- "Encounter Directory 95-96" Singapore Chamber of Commerce and Industry

4.2 Malaysian companies

| | | |
|--|---|---|
| <p>Goh Choon Lye 6H, Jalan Delima Island Glade 11700 Pulau Pinang Malaysia Tel: 60 4 658 7791 Attn: Mr Goh Choon Lye <i>Importer/exporter/wholesaler</i></p> | <p>Hoi Soon Import & Export Sdn. Bhd. Lot 9, Jalan 6, Selayang Baru 68100 Batu Caves, Selangor Malaysia Tel: 60 3 618 7028/ 9355 Fax: 60 3 618 1805 Attn: Mdm Chan Yoke Chin <i>Importer/exporter/processor</i></p> | <p>Highly Sea Products 55A, Jalan Batu Bata Off Jalan Ipoh 50400 Kuala Lumpur Malaysia Tel: 60 3 442 1775/ 441 3560 Fax: 60 3 221 0055 Attn: Mr Chia Song Lai</p> |
| <p>Kwang Yeow Heng Importer & Exporter (M) Sdn Bhd 30 Jalan Hang Kasturi 50050 Kuala Lumpur Malaysia Tel: 60 3 238 0969/73851/3 230 0995 Fax: 60 3 238 2453 <i>Importer/exporter/wholesaler/ retailer</i></p> | <p>Lonyin Seafood Trading 19B, Jalan 2, Selayang Baru 68100 Selayang Malaysia Tel: 60 3 615 1921/616 1022/3022 Fax: 60 3 615 1021 Attn: Mr Eng Keng Hua <i>Importer/wholesaler</i></p> | <p>Ming Kee Chan Sdn Bhd 48, Jalan Hang Kasturi 50050 Kuala Lumpur Malaysia Tel: 60 3 238 5002 <i>Importer/wholesaler/retailer</i></p> |
| <p>Seafresh Sdn Bhd 27 Jalan 109E Taman Desa Business Park Taman desa Off Jalan Kelang Lama 58100 Kuala Lumpur Malaysia Tel: 60 3 784 3150/3151 Fax: 60 3 784 3152 Attn: Mr Peter Kwan <i>Importer/wholesaler/processor/ retailer/restaurant</i></p> | <p>Siang Heng 44 Jalan Selangor 10300 Pulau Pinang Malaysia Tel: 60 4 262 5596 <i>Importer</i></p> | <p>Syarikat Yong Sui Szu 107 Victoria Street 10300 Pulau Pinang Malaysia Tel: 60 4 261 3027</p> |
| <p>Wing Thai Hon 24 Lor Kiedang Timor Taman Rasi, Menglembu 31540 Ipoh Malaysia Tel: 60 5 282 1392 Fax: 60 5 281 1922 Attn: Mr. Liu Hock Meng <i>Wholesaler/distributor</i></p> | <p>Wing Woh Loong Sdn Bhd 34 Jalan Banda Timah 30000 Ipoh Malaysia Tel: 60 5 254 0307 <i>Wholesaler/retailer</i></p> | <p>Yau Chun Hing & Sons Sdn Bhd 50 Jalan Banda Timah 30000 Ipoh Malaysia Tel: 60 5 254 9915 Attn: Mr Yau Kin Sun <i>Wholesaler/retailer</i></p> |
| <p>Yeoh Hwa Sin 20 Perangin Road Ghaut 10300 Pulau Pinang Malaysia Tel: 60 4 262 5596 Attn: Mr. Yeoh Hwa Sin</p> | | |

5 SHARK SPECIES USED FOR FINS

| FAO Name | Scientific Name |
|------------------------|--|
| Basking shark | <i>Cetorhinus maximus</i> (Gunnerus 1765) |
| Bigeye thresher | <i>Alopias superciliosus</i> (Lowe 1839) |
| Blue shark | <i>Prionace glauca</i> (Linnaeus 1758) |
| Bull shark | <i>Carcharhinus leucas</i> (Valenciennes 1839) |
| Creek whaler | <i>Carcharhinus fitzroyensis</i> (Whitley 1943) |
| Dusky shark | <i>Carcharhinus obscurus</i> (LeSueur 1818) |
| Great hammerhead | <i>Sphyrna mokarran</i> (Ruppell 1837) |
| Great white shark | <i>Carcharodon carcharias</i> (Linnaeus 1758) |
| Lemon shark | <i>Negaprion brevirostris</i> (Poey 1868) |
| Oceanic whitetip shark | <i>Carcharhinus longimanus</i> (Poey 1861) |
| Pelagic thresher | <i>Alopias pelagicus</i> Nakamura 1935 |
| Porbeagle | <i>Lamna nasus</i> (Bonnaterre 1788) |
| Salmon shark | <i>Lamna ditropis</i> (Hubbs & Follett 1947) |
| Sandbar shark | <i>Carcharhinus plumbeus</i> (Nardo 1827) |
| Sandtiger shark | <i>Eugomphodus taurus</i> (Rafinesque 1810) |
| Sealoped hammerhead | <i>Sphyrna lewini</i> (Griffith & Smith 1834) |
| Shortfin mako | <i>Isurus oxyrinchus</i> (Rafinesque) 1809 |
| Sicklefin lemon shark | <i>Negaprion acutidens</i> (Ruppell 1837) |
| Silky shark | <i>Carcharhinus falciformis</i> (Bibron 1839) |
| Smooth hammerhead | <i>Sphyrna zygaena</i> (Linnaeus 1758) |
| Snaggletooth shark | <i>Hemipristis elongata</i> (Klunzinger 1871) |
| Spinner shark | <i>Carcharhinus brevipinna</i> (Muller & Henle 1839) |
| Spot-tail shark | <i>Carcharhinus sorrah</i> (Valenciennes 1839) |
| Tawny nurse shark | <i>Nebrius ferrugineus</i> (Lesson 1830) |
| Thresher shark | <i>Alopias vulpinus</i> (Bonnaterre 1788) |
| Tiger shark | <i>Galeocerdo cuvier</i> (Peron & LeSueur 1822) |
| Tope shark | <i>Galeorhinus galeus</i> (Linnaeus 1758) |
| Whale shark | <i>Rhincodon typus</i> (Smith 1828) |
| Zebra shark | <i>Stegostoma fasciatum</i> (Hermann 1783) |

Source: FAO "Sharks of the world"

6 THE GRADING OF FINS INTO BLACK AND WHITE GROUPS

6.1 Information provided by Central Institute of Fisheries Technology Cochin India*

In Hong Kong shark fins are graded as follows:

| Top grade | Grade 1 | Grade 2 | Grade 3 |
|---------------------|------------------------|------------------------|----------------|
| Hammerhead shark | White shark | Whitetip shark | smaller sharks |
| <i>Sphyrna</i> spp | <i>Carcharodon</i> spp | <i>Carcharodon</i> spp | |
| Mako shark | Thresher shark | Tiger shark | |
| <i>Isurus</i> spp | <i>Galeocerdo</i> spp | <i>Galeocerdo</i> spp | |
| Blue shark | | | |
| <i>Prionace</i> spp | | | |

Other species of commercially important sharks are listed below:

White fins

Guitarfish - *Rhynchobatus djiddentis*
 Silky shark - *Carcharhinus falciformis*
 Sandbar shark - *Carcharhinus plumbeus*
 Dusky shark - *Carcharhinus obscurus*
 Bull shark - *Carcharhinus leucas*
 Lemon shark - *Negaprion brevirostris*

Black fins

Spinner shark - *Carcharhinus brevipinna*
 Blacktip shark - *Carcharhinus limbatus*
 Blacknose shark - *Carcharhinus acronotus*
 Tiger shark - *Galeocerdo cuvier*
 Black finned shark - *Carcharhinus melanopterus*

6.2 Information provided by The Marine Products Development Authority*

Major species of sharks from which fins are extracted:

- *Carcharhinus* spp
- *Scaliadan* spp
- *Galeocerdo* spp
- *Sphyrna* spp

Sharks from Indian waters that yield:

White fins

Whale shark - *Rhincodon typus*
Oceanic whitetip shark - *Carcharhinus longimanus*
Tiger shark - *Galeocerdo cuvier*
Indian lemon shark - *Negaprion acutidens*
Grey shark - *Rhizoprionodon acutus*
Indian dog shark/Spade nose shark - *Scoliodon laticaudus*
Round head/Hammerhead shark - *Sphyrna zygaena*
Scalloped hammerhead shark - *Sphyrna lewini*

Black fins

Grey shark/Black shark *Carcharhinus limbatus*
Black finned shark *Carcharhinus melanopterus*

6.3 Recent market trends in the Indian shark fin trade

Although almost all shark fins are exported, there is an internal demand for shark fin rays, especially in major hotels. India has been exporting shark fin to Hong Kong and Singapore for some time and recently new markets such as the USA, Malaysia, Germany, Taiwan Province of China and the United Arab Emirates have emerged.

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Yang, Lin and Zhou (1997) The Complete Book of Dried Seafood & Foodstuffs (Chinese Edition). Hong Kong, China.

*These shark names are exactly as provided by the authority mentioned.

8 TABLES OF TRADE STATISTICS FOR SINGAPORE AND MALAYSIA

The source of all Singapore tables is The Trade Development Board Statistics – Imports and Exports.

The source of all Malaysia tables is the Department of Statistics, Malaysia.

These figures are given as published by the relevant authority. Where the total given is not equal to the sum of the column above, it is assumed that this is due to rounding errors or the inclusion of other, unpublished, data.

Table 1 Singapore trade in dried or salted shark fin

| Year | Imports | | Exports | | Domestic exports | |
|-------|---------|-----------|---------|-----------|------------------|-----------|
| | Tonnes | CIF value | Tonnes | FOB value | Tonnes | FOB value |
| 1986 | 861 | 21 304 | 736 | 22 559 | 7 | 152 |
| 1987 | 1 178 | 34 049 | 1 089 | 36 827 | 18 | 255 |
| 1988 | 1 899 | 40 754 | 877 | 36 399 | 1 | 51 |
| 1989 | 1 198 | 38 137 | 1 525 | 31 377 | 1 | 76 |
| 1990 | 1 006 | 33 338 | 806 | 28 782 | 7 | 94 |
| 1991 | 968 | 44 646 | 828 | 39 713 | 40 | 2 410 |
| 1992 | 1 066 | 57 220 | 977 | 56 539 | 122 | 4 182 |
| 1993 | 1 133 | 51 643 | 869 | 47 083 | 183 | 8 915 |
| 1994 | 1 230 | 50 262 | 1 042 | 64 846 | 254 | 15 226 |
| 1995 | 983 | 49 437 | 871 | 64 416 | 66 | 5 254 |
| 1996 | 931 | 48 042 | 797 | 55 110 | 40 | 2 894 |
| 01-06 | 425 | 25 852 | 292 | 25 116 | 15 | 1 442 |
| 1997* | | | | | | |

Value in S\$ 1 000

*Shark fins dried whether or not salted, excluding smoked

Table 2 Singapore trade in prepared shark fin

| Year | Imports | | Exports | | Domestic Exports | |
|-------------------|---------|-----------|---------|-----------|------------------|-----------|
| | Tonnes | CIF Value | Tonnes | FOB value | Tonnes | FOB value |
| 1986 ¹ | 8.118 | 813 | 14.459 | 1 164 | 9.805 | 919 |
| 1987 ¹ | 20.381 | 1 348 | 33.279 | 1 441 | 31.823 | 1 359 |
| 1988 ¹ | 26.016 | 1 891 | 43.358 | 5 702 | 29.544 | 4 822 |
| 1989 ² | 36.360 | 1 530 | 48.549 | 4 966 | 45.264 | 4 629 |
| 1990 ² | 17.884 | 937 | 29.399 | 4 934 | 25.599 | 4 578 |
| 1991 ⁴ | 46.647 | 1 564 | 143.700 | 4 746 | 119.776 | 2 595 |
| 1992 ² | 16.125 | 1 258 | 97.814 | 4 112 | 80.035 | 2 313 |
| 1993 ³ | 18.199 | 1 353 | 67.404 | 3 854 | 49.895 | 2 045 |
| 1994 ⁴ | 76.789 | 2 381 | 72.540 | 2 215 | 62.914 | 1 648 |
| 1995 ² | 143.789 | 5 206 | 63.250 | 2 203 | 38.340 | 1 221 |
| 1996 ⁴ | 71.230 | 5 496 | 28.631 | 1 771 | 16.639 | 604 |
| 01-06 | 28.505 | 2 569 | 13.592 | 1 108 | 4.882 | 188 |
| 1997 ³ | | | | | | |

Value in S\$ 1 000

¹Shark fin prepared not canned, ²Shark fin prepared, ³Shark fin prepared ready for use

Table 3 Singapore imports of dried or salted shark fin

| Country of Origin | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | | |
|-------------------|------|-------|------|-------|------|-------|------|-------|------|-------|------|--------|------|--------|------|--------|------|-------|---|
| | Q | V | Q | V | Q | V | Q | V | Q | V | Q | V | Q | V | Q | V | Q | V | |
| America Samoa | - | - | 4 | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Argentina | 3 | 86 | - | - | - | - | 25 | - | - | - | - | - | - | - | - | - | - | - | - |
| Australia | - | - | 7 | 195 | 8 | 428 | 14 | 564 | 15 | 595 | 11 | 617 | 5 | 311 | 15 | 1 075 | 8 | 561 | - |
| Bahrain | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Bangladesh | 15 | 240 | 5 | 78 | 7 | 305 | 3 | 72 | 7 | 187 | 9 | 327 | 10 | 438 | 5 | 222 | 2 | 41 | - |
| Brazil | 30 | 1 107 | 29 | 1 393 | 31 | 1 093 | 41 | 1 689 | 36 | 781 | 12 | 763 | 2 | 142 | 2 | 132 | 1 | 38 | - |
| Canada | - | - | - | - | - | - | - | - | - | - | 4 | 158 | 1 | 68 | - | - | - | - | - |
| Chile | - | - | 3 | 97 | 8 | 231 | - | - | - | - | - | - | - | - | - | - | 2 | 152 | - |
| China PR | - | - | - | - | - | - | 3 | 72 | 8 | 413 | 23 | 1 286 | 3 | 306 | 9 | 742 | 2 | 152 | - |
| Colombia | 3 | 169 | 7 | 431 | 5 | 271 | 3 | 138 | 3 | 177 | - | - | - | - | - | - | - | - | - |
| Costa Rica | 4 | 276 | 4 | 228 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Côte d'Ivoire | - | - | - | - | 2 | 39 | 4 | 45 | - | - | - | - | - | - | - | - | - | - | - |
| Cuba | - | 28 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Djibouti | - | - | - | - | - | - | 1 | 35 | 3 | 79 | - | - | 1 | 26 | 5 | 173 | - | - | - |
| Ecuador | - | - | 1 | 30 | 4 | 80 | 5 | 144 | 1 | 29 | - | - | 2 | 205 | - | - | - | - | - |
| Egypt AR | - | - | 8 | 305 | - | - | 2 | 85 | - | - | - | - | 1 | 48 | 2 | 88 | 2 | 132 | - |
| Fiji | - | - | - | - | - | - | 1 | 51 | - | - | 4 | 243 | 3 | 161 | 3 | 145 | 5 | 198 | - |
| France | - | - | - | - | - | - | 1 | 49 | - | - | - | - | - | - | - | - | - | - | - |
| Guatemala | - | - | 2 | 136 | 1 | 86 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Germany FR | - | - | - | - | - | - | - | - | - | - | 1 | 50 | - | - | - | - | - | - | - |
| Ghana | - | - | 4 | 61 | 6 | 78 | 12 | 268 | 7 | 203 | 1 | 41 | 1 | 65 | 2 | 101 | 2 | 116 | - |
| Guam | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Guatemala | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | 303 | - | - | - |
| Guinea | - | - | 6 | 92 | 4 | 84 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Hong Kong | 44 | 1 109 | 218 | 4 011 | 87 | 6 344 | 125 | 4 731 | 100 | 6 642 | 113 | 11 602 | 124 | 12 170 | 130 | 11 489 | 90 | 7 752 | - |
| India | 163 | 3 251 | 145 | 4 536 | 288 | 7 386 | 234 | 5 315 | 149 | 3 398 | 121 | 3 116 | 176 | 4 961 | 162 | 4 047 | 135 | 5 360 | - |
| Iran IR | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 27 | - |
| Japan | 139 | 3 704 | 104 | 4 298 | 91 | 4 165 | 89 | 3 515 | 88 | 2 544 | 104 | 4 664 | 95 | 6 719 | 81 | 5 203 | 118 | 6 087 | - |
| Kenya | 18 | 577 | 22 | 592 | 19 | 481 | 33 | 941 | 26 | 653 | 13 | 346 | 11 | 510 | 15 | 587 | 29 | 1 052 | - |
| Korea Rep | 52 | 1 509 | 49 | 1 619 | 62 | 1 700 | 42 | 1 166 | 43 | 1 172 | 82 | 3 056 | 39 | 2 003 | 36 | 2 047 | 63 | 2 571 | - |
| Kuwait | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Liberia | 2 | 194 | 2 | 87 | 1 | 12 | 1 | 48 | 1 | 40 | - | - | - | - | - | - | - | - | - |
| Madagascar | - | - | - | - | 1 | 33 | 1 | 46 | 4 | 107 | 2 | 62 | 6 | 261 | 5 | 176 | 11 | 191 | - |
| Malaysia | - | - | 30 | 192 | 705 | 41 | - | - | 9 | 52 | 5 | 36 | 4 | 59 | 11 | 135 | 6 | 264 | - |
| Maldives Rep | 18 | 684 | 15 | 863 | 11 | 638 | 8 | 410 | 4 | 127 | 13 | 726 | 17 | 1 030 | 16 | 1 142 | 23 | 985 | - |

Table 3 continued

| Country of Origin | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | | |
|-------------------|------|--------|-------|--------|-------|--------|-------|--------|-------|--------|------|--------|-------|--------|-------|--------|-------|--------|----|
| | Q | V | Q | V | Q | V | Q | V | Q | V | Q | V | Q | V | Q | V | Q | V | |
| Mauritius | 11 | 196 | 14 | 232 | 12 | 243 | 8 | 156 | 7 | 132 | 314 | 8 | 282 | 35 | 373 | 92 | 517 | - | - |
| Niyaminar | - | - | - | - | - | - | - | - | - | - | 5 | 199 | 1 | 46 | - | - | - | - | - |
| Mexico | - | - | 1 | 96 | 2 | 190 | 26 | 1 304 | - | - | - | - | - | 37 | - | - | - | - | - |
| Mozambique | 1 | 26 | - | - | 10 | 220 | 5 | 256 | 2 | 123 | 4 | 148 | - | - | - | - | - | - | - |
| New Caledonia | 2 | 52 | 1 | 30 | 1 | 30 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| New Zealand | 3 | 71 | 4 | 81 | 19 | 315 | 10 | 290 | 20 | 462 | 11 | 303 | 14 | 486 | 12 | 563 | 23 | 1 101 | |
| Norway | 5 | 111 | 27 | 656 | 11 | 211 | 31 | 31 | 1 | 26 | 10 | 316 | 6 | 293 | 2 | 159 | 3 | 43 | |
| Oman | - | - | 22 | 234 | 40 | 658 | 8 | 201 | 15 | 432 | 20 | 1 030 | 32 | 1 769 | 37 | 2 738 | 3 | 1 21 | |
| Pakistan | 106 | 1 220 | 148 | 3 054 | 172 | 4 099 | 122 | 3 953 | 106 | 3 081 | 75 | 2 587 | 108 | 4 497 | 72 | 2 078 | 78 | 2 635 | |
| Panama | - | - | - | - | 1 | 55 | 3 | 244 | - | - | - | - | - | - | - | - | - | - | - |
| Papua New Guinea | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Peru | 4 | 114 | 15 | 407 | 35 | 834 | 24 | 498 | - | - | 1 | 88 | 3 | 165 | 4 | 219 | 6 | 138 | |
| Philippines | 1 | 31 | - | - | - | - | - | - | - | - | - | - | 1 | 30 | - | - | 1 | 94 | |
| Portugal | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| Saudi Arabia | - | - | - | - | - | - | 4 | 71 | 5 | 134 | 9 | 317 | 13 | 348 | 10 | 271 | 11 | 322 | |
| Scythelles | 4 | 120 | 10 | 365 | 12 | 610 | 12 | 613 | 9 | 520 | 9 | 498 | 11 | 845 | 11 | 925 | 9 | 792 | |
| Solomon Isles | 1 | 38 | 1 | 36 | - | - | - | - | - | - | - | - | - | 1 | 147 | 2 | 192 | 1 | 92 |
| Somali DR | - | - | 6 | 306 | 11 | 340 | 9 | 466 | 3 | 58 | 3 | 102 | 4 | 259 | - | - | - | - | |
| Spain | 30 | 671 | 12 | 395 | - | - | 8 | 384 | 62 | 2 238 | 40 | 1 472 | 36 | 1 953 | 77 | 2 073 | 66 | 1 546 | |
| Sri Lanka | 41 | 1 231 | 42 | 1 476 | 49 | 1 508 | 59 | 1 635 | 52 | 1 793 | 45 | 1 915 | 60 | 3 812 | 55 | 3 300 | 72 | 3 196 | |
| Taiwan (POC) | 5 | 125 | 37 | 508 | - | - | - | - | 7 | 90 | 12 | 706 | 24 | 867 | 80 | 859 | 55 | 979 | |
| Tanzania | - | - | - | - | 2 | 40 | - | - | - | - | 1 | 83 | - | - | 2 | 83 | - | - | |
| Tsingind | 13 | 494 | 9 | 423 | 30 | 926 | 5 | 337 | 27 | 821 | 3 | 229 | 2 | 291 | 12 | 1 046 | 16 | 994 | |
| Turkey | - | - | - | - | - | - | 3 | 48 | 1 | 34 | - | - | - | - | - | - | - | - | |
| U.A. Emirates | 29 | 949 | 40 | 1 768 | 16 | 964 | 74 | 1 658 | 37 | 1 210 | 14 | 706 | 34 | 2 107 | 31 | 2 145 | 24 | 1 753 | |
| UKingdom | 1 | 54 | 15 | 122 | 3 | 229 | 1 | 81 | - | - | - | - | - | 29 | - | - | - | - | |
| USA | - | - | 9 | 235 | - | 37 | 14 | 991 | 3 | 238 | 5 | 452 | 6 | 425 | 14 | 1 454 | 37 | 1 952 | |
| Uruguay | - | - | - | - | 10 | 430 | 11 | 448 | - | - | - | - | - | - | 2 | 46 | 33 | 369 | |
| USSR | - | - | - | - | 2 | 49 | - | - | - | - | - | - | - | - | - | - | - | - | |
| Venezuela | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4 | 414 | 1 | 37 | |
| Vietnam SR | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5 | 579 | 3 | 763 | |
| Yemen AR | 30 | 506 | 30 | 802 | 62 | 1 734 | 93 | 3 245 | 116 | 3 360 | 137 | 5 338 | 181 | 7 892 | 149 | 5 821 | 160 | 5 821 | |
| Yemen PDR | 56 | 1 188 | 37 | 1 284 | 40 | 1 566 | 4 | 19 | - | - | 9 | 342 | 1 | 50 | - | - | - | - | |
| OC Africa | - | - | - | - | - | - | 1 | 38 | 2 | 42 | - | - | 4 | 324 | 6 | 429 | 16 | 420 | |
| OC America | - | - | - | - | - | - | - | - | 1 | 47 | 5 | 310 | 1 | 142 | 1 | 227 | 2 | 198 | |
| OC Asia | 13 | 670 | 33 | 2 163 | 21 | 1 756 | 28 | 1 606 | 9 | 773 | 10 | 524 | 9 | 543 | - | - | - | - | |
| OC Oceania | 5 | 102 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4 | 99 | |
| Other countries | 9 | 101 | 4 | 49 | 7 | 104 | 8 | 105 | 4 | 67 | 3 | 91 | 3 | 44 | 8 | 184 | 2 | 71 | |
| Total | 861 | 21 304 | 1 178 | 34 049 | 1 899 | 40 784 | 3 198 | 38 137 | 1 096 | 33 338 | 968 | 44 646 | 1 066 | 47 220 | 1 133 | 51 643 | 1 230 | 50 262 | |

Table 3 continued

| Country of Origin | 1995 | | 1996 | | Jan-Jun 1997 | |
|---------------------|------------|---------------|------------|---------------|--------------|---------------|
| | Q | V | Q | V | Q | V |
| Argentina | - | - | 14 | 216 | - | - |
| Australia | 7 | 516 | 14 | 1 131 | 7 | 689 |
| Bahrain | - | 33 | 1 | 79 | - | - |
| Bangladesh | 1 | 27 | - | - | - | - |
| Chile | 1 | 68 | - | - | - | - |
| China PR | 16 | 430 | 6 | 945 | 5 | 399 |
| Costa Rica | 3 | 466 | 2 | 81 | - | - |
| Côte d'Ivoire | - | - | 1 | 42 | - | - |
| Egypt | 1 | 46 | - | - | - | - |
| Fiji | 2 | 114 | - | - | - | - |
| Ghana | 1 | 26 | - | - | - | - |
| Guam | 1 | 29 | - | - | - | - |
| Honduras | 3 | 115 | - | - | - | - |
| Hong Kong | 106 | 7 267 | 139 | 11 746 | 99 | 9 104 |
| India | 117 | 3 509 | 112 | 4 927 | 63 | 3 007 |
| Japan | 57 | 3 320 | 37 | 1 813 | 13 | 692 |
| Kenya | 6 | 307 | 21 | 1 030 | 5 | 187 |
| Korea Rep of | 31 | 1 547 | 39 | 1 870 | 39 | 2 112 |
| Kuwait | 2 | 41 | 1 | 36 | - | - |
| Madagascar | - | - | 1 | 51 | - | - |
| Malaysia | 2 | 298 | 3 | 199 | - | 35 |
| Maldives Rep of | 11 | 1 015 | 16 | 1 278 | 11 | 1 163 |
| Mauritius | - | - | 1 | 50 | 1 | 11 |
| Myanmar | - | - | 1 | 34 | - | - |
| Mozambique | - | 38 | - | - | - | - |
| New Zealand | 18 | 1 266 | 15 | 1 195 | 1 | 295 |
| Northern Mariana Is | 3 | 138 | - | - | - | - |
| Norway | 1 | 44 | - | - | - | - |
| Oman | 2 | 70 | 13 | 456 | 3 | 123 |
| Pakistan | 90 | 3 947 | 53 | 2 352 | 28 | 1 240 |
| Panama | 1 | 60 | - | - | - | - |
| Papua New Guinea | 4 | 257 | 1 | 38 | 7 | 69 |
| Philippines | 1 | 44 | 2 | 106 | 1 | 183 |
| Qatar | - | 43 | - | - | - | - |
| Saudi Arabia | 8 | 240 | 10 | 115 | 3 | 23 |
| Seychelles | 11 | 1 005 | 10 | 815 | 5 | 192 |
| Solomon Islands | 2 | 136 | 7 | 310 | 3 | 210 |
| South Africa | 17 | 443 | 10 | 857 | 7 | 568 |
| Spain | 31 | 1 698 | 58 | 1 976 | - | - |
| Sri Lanka | 79 | 3 992 | 40 | 2 023 | 15 | 843 |
| Taiwan (POC) | 126 | 3 115 | 109 | 3 394 | 39 | 1 684 |
| Tanzania | 2 | 74 | 2 | 76 | - | - |
| Thailand | 4 | 213 | 6 | 424 | 2 | 73 |
| U Arab Emirates | 22 | 1 450 | 23 | 1 065 | 2 | 132 |
| USA | 38 | 2 228 | 51 | 2 741 | 13 | 691 |
| Vietnam SR | 6 | 2 234 | - | - | 1 | 68 |
| Yemen | 127 | 5 140 | 79 | 3 153 | 20 | 1 004 |
| OC Africa | 2 | 121 | 31 | 1 336 | 14 | 546 |
| OC Oceania | 3 | 177 | 1 | 28 | - | - |
| Other Countries | 2 | 69 | 2 | 45 | - | - |
| Total | 983 | 49 437 | 931 | 48 042 | 425 | 25 852 |

Q=quantity in tonnes, V=value in \$5 1 000 CIF

* Redefined as "Shark fins dried whether or not salted excluding smoked"

Table 4 Singapore imports of prepared shark fin

| Country of Origin | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|-------------------|---------------|--------------|---------------|--------------|---------------|--------------|----------------|--------------|---------------|--------------|---------------|--------------|
| | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value |
| Australia | - | - | - | - | - | - | - | - | - | - | 987 | - |
| China PR | - | - | 1 025 | 32 | - | - | - | - | 150 | 27 | - | - |
| Hong Kong | 6 315 | 752 | 5 688 | 817 | 4 005 | 781 | 13 616 | 639 | 7 782 | 478 | 3 152 | 328 |
| Japan | - | - | - | - | 3 10 | 59 | 1 205 | 89 | 521 | 40 | - | - |
| Maldives Rep | - | - | - | - | 64 | 29 | - | - | - | - | - | - |
| New Zealand | - | - | - | - | - | - | 377 | 45 | - | - | - | - |
| Pakistan | - | - | - | - | - | - | - | - | - | - | 6 778 | 306 |
| Peru | 1 582 | 49 | - | - | - | - | - | - | - | - | 1 820 | 45 |
| Philippines | - | - | - | - | 1 005 | 150 | - | - | - | - | - | - |
| Seychelles | - | - | 690 | 29 | - | - | - | - | 417 | 39 | - | - |
| Sri Lanka | - | - | - | - | - | - | - | - | - | - | - | - |
| Thailand | - | - | 12 294 | 409 | 17 447 | 615 | 20 152 | 705 | 8 744 | 319 | 14 466 | 587 |
| U Arab Emirates | - | - | - | - | - | - | - | - | - | - | 2 167 | 93 |
| U.K. | - | - | - | - | 503 | 42 | - | - | - | - | 10 010 | 90 |
| USA | - | - | - | - | - | - | 180 | 27 | - | - | - | - |
| OC S/E Asia | - | - | 684 | 41 | 2 046 | 108 | 830 | 25 | 270 | 34 | 7 386 | 55 |
| Other Countries | - | - | - | - | - | - | - | - | - | - | - | - |
| Total | 8 118 | 813 | 20 381 | 1 348 | 26 016 | 1 891 | 36 360 | 1 530 | 17 884 | 937 | 46 676 | 1 564 |
| | | | 1993 | | 1994 | | 1995 | | 1996 | | Janshen 1997 | |
| Australia | - | - | 1 868 | 114 | 19 250 | 368 | 10 490 | 259 | 1 981 | 269 | 518 | 70 |
| China PR | - | - | - | - | - | - | - | - | 349 | 224 | - | - |
| Hong Kong | 3 320 | 433 | 5 823 | 629 | 16 595 | 1 207 | 41 270 | 3 414 | 40 415 | 3 373 | 23 002 | 2 000 |
| India | - | - | 1 745 | 33 | - | - | 1 020 | 120 | 5 037 | 725 | - | - |
| Japan | 322 | 40 | - | - | - | - | 2 223 | 246 | 2 749 | 417 | - | - |
| Malaysia | - | - | - | - | - | - | - | - | 240 | 26 | - | - |
| Maldives Rep | 2 663 | 218 | - | - | 750 | 36 | - | - | - | - | - | - |
| Myanmar | 380 | 25 | - | - | - | - | - | - | - | - | - | - |
| New Zealand | - | - | - | - | - | - | 991 | 62 | 1 182 | 338 | - | - |
| Pakistan | 1 275 | 93 | - | - | - | - | - | - | - | - | - | - |
| Spain | - | - | - | - | 35 136 | 459 | 53 216 | 621 | - | - | - | - |
| Sri Lanka | 4 272 | 307 | 2 259 | 201 | - | - | 6 089 | 265 | - | - | - | - |
| Taiwan PRC | - | - | - | - | - | - | - | - | 3 027 | 53 | - | - |
| Thailand | 247 | 27 | 1 937 | 202 | 178 | 24 | - | - | 15 020 | 103 | - | - |
| U Arab Emirates | 1 032 | 347 | 417 | 27 | - | - | - | - | - | - | - | - |
| USA | - | - | - | - | - | - | 12 315 | 63 | - | - | - | - |
| Uruguay | - | - | - | - | - | - | 10 900 | 100 | - | - | - | - |
| OC Africa | 270 | 25 | 309 | 74 | 201 | 26 | - | - | - | - | - | - |
| OC America | - | - | - | - | 879 | 60 | - | - | - | - | - | - |
| Other Countries | 2 346 | 53 | 4 042 | 73 | 3 792 | 100 | 3 237 | 37 | 1 230 | 28 | - | - |
| Total | 16 125 | 1 258 | 18 199 | 1 353 | 76 789 | 2 381 | 143 789 | 5 206 | 71 230 | 5 496 | 28 505 | 2 569 |

Quantity in kilograms, Value in \$5 | 000 CIF

Table 5 Singapore exports of dried or salted shark fin (Value=SS 1 000 FOB)

| Country of Destination | 1985 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|------------------------|------------|---------------|--------------|---------------|--------------|---------------|---------------|---------------|------------|---------------|------------|---------------|
| | Tonnes | Value | Tonnes | Value | Tonnes | Value | Tonnes | Value | Tonnes | Value | Tonnes | Value |
| Australia | 1 | 25 | - | - | - | - | 1 | 63 | 2 | 94 | 1 | 112 |
| Bruner Darussalam | 7 | 170 | 2 | 41 | 23 | 1 418 | 16 | 148 | 16 | 171 | 6 | 94 |
| Brunei Darussalam | 12 | 118 | 48 | 2 380 | 82 | 3 840 | 78 | 3 641 | 98 | 3 174 | 122 | 3 230 |
| Canada | - | - | 1 | 119 | 2 | 269 | - | - | 1 | 112 | - | - |
| China PR | - | - | - | - | - | - | - | - | - | - | 2 | 112 |
| France | - | - | - | - | - | - | - | - | - | - | - | - |
| Hong Kong | 599 | 21 018 | 881 | 32 707 | 627 | 27 735 | 1 314 | 23 634 | 503 | 21 883 | 554 | 31 885 |
| Japan | - | - | - | - | 5 | 176 | 26 | 408 | 3 | 326 | 33 | 1 698 |
| Korea Rep of | - | - | - | - | 18 | 1 047 | - | - | 30 | 783 | - | - |
| Malaysia | 105 | 829 | 140 | 1 208 | 67 | 848 | 49 | 351 | 133 | 1 593 | 77 | 1 577 |
| Other countries | 4 | 19 | - | - | - | - | 5 | 214 | - | - | - | - |
| USA | - | - | - | - | - | - | - | - | - | - | - | - |
| Other countries | 4 | 19 | 10 | 63 | 2 | 65 | 1 | 64 | - | - | 1 | 52 |
| Total | 736 | 23 558 | 1 089 | 36 827 | 877 | 36 399 | 1 525 | 31 377 | 866 | 28 782 | 828 | 39 713 |
| Australia | 1 | 219 | 2 | 229 | 1 | 43 | - | - | - | - | - | - |
| Belgium | - | - | - | - | - | - | - | - | - | - | - | - |
| Bruner Darussalam | 1 | 42 | 1 | 43 | 3 | 270 | 2 | 285 | 1 | 353 | - | - |
| Canada | - | - | - | - | - | - | - | - | - | - | - | - |
| China PR | 47 | 2 256 | - | - | - | - | 8 | 273 | 15 | 860 | 2 | 387 |
| France | - | - | 1 | 379 | - | 83 | - | - | - | - | - | - |
| Germany FR | - | - | - | - | - | - | - | - | - | - | - | - |
| Hong Kong | 673 | 47 742 | 632 | 40 611 | 732 | 49 422 | 664 | 45 706 | 501 | 34 533 | 191 | 15 836 |
| India | - | - | 1 | 42 | - | - | - | - | - | - | - | - |
| Japan | 4 | 111 | 2 | 281 | 1 | 109 | 1 | 67 | - | - | - | 10 |
| Korea DPR | - | - | - | - | - | - | - | - | - | - | - | - |
| Korea Rep of | 1 | 73 | 2 | 110 | - | 37 | - | - | - | - | - | - |
| Malaysia | 110 | 1 840 | 106 | 1 516 | 112 | 7 811 | 120 | 11 075 | 187 | 14 190 | 77 | 7 617 |
| Myanmar | 110 | 2 611 | 81 | 2 042 | 59 | 2 702 | 44 | 3 276 | 28 | 2 273 | - | - |
| Philippines | 3 | 53 | 5 | 194 | 6 | 112 | 7 | 137 | - | - | - | - |
| Seychelles | - | - | - | - | - | - | - | - | - | - | - | - |
| Solomon Islands | - | - | - | - | - | - | - | - | - | - | - | - |
| Taiwan (POC) | 5 | 171 | 4 | 166 | 66 | 544 | 35 | 1 064 | 22 | 911 | - | - |
| Thailand | 12 | 580 | 30 | 1 413 | 38 | 2 681 | 38 | 2 218 | 39 | 1 844 | 17 | 951 |
| U Arab Emirates | 2 | 96 | - | - | - | - | - | - | - | - | - | - |
| UK | 8 | 533 | - | - | 6 | 66 | 10 | 241 | 2 | 64 | - | - |
| USA | - | - | - | - | - | - | - | - | - | - | - | - |
| Yemen | 1 | 49 | - | - | 17 | 965 | - | - | - | - | - | - |
| Other Countries | - | - | - | - | - | - | - | - | - | - | - | - |
| Total | 977 | 56 530 | 869 | 47 083 | 1 042 | 64 804 | 64 416 | 64 416 | 997 | 56 110 | 292 | 25 116 |

Table 6 Singapore exports of prepared shark fin

| Country of Destination | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|------------------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------------|--------------|
| | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value |
| Australia | 435 | 53 | 744 | 38 | 739 | 48 | 1 578 | 73 | 413 | 102 | 3 439 | 99 |
| Brunai Darussalam | 525 | 35 | 202 | 30 | 207 | 29 | - | - | 235 | 30 | - | - |
| Canada | 1 486 | 106 | - | - | 1 864 | 35 | - | - | - | - | 316 | 38 |
| France | 3 312 | 373 | 2 805 | 259 | 3 144 | 681 | 959 | 193 | 1 210 | 161 | 665 | 119 |
| Germany FR | 848 | 95 | 838 | 102 | 847 | 152 | 580 | 102 | 1 206 | 184 | 46 607 | 1 619 |
| Hong Kong | 4 849 | 260 | 1 555 | 73 | 9 566 | 613 | 10 735 | 568 | 3 102 | 355 | - | - |
| Italy | - | - | - | - | - | - | - | - | 440 | 62 | - | - |
| Japan | - | - | 2 479 | 389 | 20 669 | 3 860 | 17 117 | 3 631 | 19 101 | 3 869 | 12 612 | 2 005 |
| Korea Rep of | - | - | - | - | - | - | 1 014 | 119 | - | - | - | - |
| Malaysia | 2 689 | 144 | 1 064 | 76 | 3 215 | 102 | 559 | 38 | - | - | 728 | 74 |
| Myanmar | - | - | 960 | 99 | 1 680 | 113 | - | - | - | - | - | - |
| Philippines | - | - | - | - | - | - | - | - | - | - | - | - |
| Taiwan (POC) | - | - | - | - | - | - | 3 522 | 213 | 366 | 32 | 10 248 | 217 |
| UK | - | - | - | - | - | - | - | - | - | - | 3 691 | 51 |
| USA | - | - | 22 073 | 345 | 3 057 | 50 | 7 916 | 254 | 2 815 | 211 | 10 035 | 110 |
| Other Countries | 326 | 38 | 550 | 29 | - | - | 570 | 44 | 572 | 48 | 2 615 | 60 |
| Total | 14 459 | 1 104 | 33 279 | 1 441 | 43 358 | 5 702 | 48 549 | 4 866 | 29 399 | 4 934 | 143 700 | 4 746 |
| | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | Jan-Jun 1997 | |
| Australia | 884 | 43 | - | - | - | - | 357 | 25 | 892 | 80 | 910 | 97 |
| Brunai Darussalam | 825 | 90 | - | - | 2 600 | 184 | 3 639 | 183 | 2 046 | 131 | - | - |
| Canada | - | - | - | - | - | - | - | - | - | - | - | - |
| France | 401 | 78 | 134 | 34 | 3 240 | 28 | 3 240 | 28 | - | - | - | - |
| Germany FR | 1 139 | 214 | 1 118 | 243 | 1 000 | 216 | 1 107 | 239 | 500 | 108 | - | |
| Hong Kong | 21 636 | 798 | 28 694 | 1 535 | 43 890 | 608 | 22 660 | 549 | 4 671 | 753 | - | |
| Japan | 13 132 | 2 247 | 6 816 | 1 690 | 5 872 | 789 | 1 567 | 394 | 5 649 | 274 | 1 354 | |
| Malaysia | 531 | 57 | 1 294 | 32 | 5 956 | 159 | 5 215 | 182 | 2 977 | 316 | 4 621 | |
| Philippines | 6 730 | 117 | 3 212 | 53 | 2 160 | 39 | 5 180 | 81 | 2 165 | 42 | - | |
| Taiwan (POC) | 42 332 | 294 | 18 232 | 136 | 5 063 | 99 | 3 800 | 106 | - | - | - | |
| Thailand | - | - | - | - | - | - | 11 608 | 106 | - | - | - | - |
| UK | 3 122 | 41 | - | - | - | - | - | - | - | - | - | - |
| USA | 4 882 | 68 | 6 958 | 88 | 2 607 | 54 | 2 867 | 320 | 2 472 | 32 | - | |
| Other Countries | 2 209 | 44 | 945 | 43 | 752 | 39 | 2 010 | 46 | 3 220 | 34 | - | |
| Total | 97 814 | 4 112 | 67 404 | 3 854 | 72 540 | 2 215 | 63 250 | 2 263 | 28 631 | 1 771 | 13 592 | 1 108 |

Quantity-Kilograms, Value=\$ 1 000 FOB

Table 7 Singapore domestic exports of dried or salted shark fin

| Country of Destination | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|------------------------|------------|--------------|------------|--------------|------------|---------------|-----------|--------------|-----------|--------------|-----------|---------------------|
| | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value |
| Australia | - | - | - | - | - | - | - | - | - | - | - | - |
| Canada | - | - | - | - | - | - | - | 28 | - | - | - | 33 |
| France | - | - | - | - | - | - | - | - | - | - | - | 140 |
| Hong Kong | 3 | 81 | 8 | 212 | - | - | - | - | 39 | 24 | 1 351 | 24 |
| Japan | - | - | - | - | - | - | - | - | - | - | - | 5 748 |
| Korea Rep of | - | - | - | - | - | 40 | - | 37 | - | 30 | - | - |
| Malaysia | 3 | 24 | - | - | - | - | - | - | - | - | 74 | 74 |
| UK | - | - | - | - | - | - | - | - | - | - | 26 | 26 |
| Other Countries | 2 | 47 | 10 | 43 | - | - | - | - | 6 | 25 | - | 38 |
| Total | 7 | 152 | 18 | 255 | 1 | 51 | 1 | 76 | 7 | 94 | 40 | 2 410 |
| | | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | Jan-Jun 1997 |
| Australia | - | - | 1 | 193 | - | - | - | - | - | - | - | - |
| Brunei Darussalam | - | - | - | - | 1 | 84 | - | 53 | - | 49 | - | - |
| China PR | 15 | 97 | - | - | - | - | - | - | 1 | 91 | - | - |
| France | - | 25 | 64 | 64 | - | - | - | - | - | - | - | - |
| Hong Kong | 79 | 3 595 | 160 | 7 685 | 216 | 16 163 | 53 | 4 597 | 19 | 2 028 | 13 | 1 105 |
| Japan | - | - | - | - | 1 | 66 | - | - | - | - | - | - |
| Korea Rep of | 1 | 69 | 24 | 24 | - | 37 | - | - | - | - | - | - |
| Malaysia | 18 | 224 | - | - | 4 | 390 | 3 | 323 | 18 | 547 | 3 | 239 |
| Myanmar | - | - | - | - | - | - | - | 43 | 1 | 149 | - | - |
| Philippines | 2 | 42 | 5 | 104 | 6 | 112 | 6 | 118 | - | - | - | - |
| Taiwan (POC) | - | - | - | - | - | - | 3 | 45 | - | - | - | - |
| Thailand | - | - | 14 | 763 | 19 | 1 332 | - | 47 | - | - | - | - |
| UK | - | - | 32 | 32 | - | - | - | - | - | - | - | - |
| USA | 6 | 34 | - | - | 6 | 24 | - | - | - | - | - | - |
| Other Countries | 1 | 63 | 3 | 82 | - | - | - | - | 1 | 30 | - | - |
| Total | 122 | 4 182 | 183 | 8 915 | 254 | 15 226 | 66 | 5 254 | 40 | 2 894 | 15 | 1 442 |

Quantity in tonnes, Value in \$1 000 FOB

Table 8 Singapore domestic exports of prepared shark fin

| Country of destination | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|------------------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|----------------|--------------|
| | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value |
| Australia | 425 | - | 744 | 38 | - | - | 1 541 | 71 | 335 | 80 | 3 137 | 53 |
| Canada | 1 468 | 196 | - | - | 112 | 27 | - | - | - | - | - | - |
| France | 3 312 | 373 | 2 805 | 259 | 3 144 | 681 | 959 | 193 | 1 210 | 161 | 211 | 36 |
| Germany FR | 680 | 74 | 828 | 102 | 847 | 152 | 565 | 99 | 1 053 | 157 | 665 | 119 |
| Hong Kong | 1 824 | 125 | 930 | 63 | - | - | 9 076 | 196 | - | - | 36 288 | 438 |
| Italy | - | - | - | - | - | - | - | - | 440 | 42 | - | - |
| Japan | - | - | 2 479 | 389 | 20 628 | 3 850 | 16 567 | 3 541 | 19 101 | 3 869 | 6 675 | 1 282 |
| Korea Rep of | - | - | - | - | - | - | 984 | 111 | - | - | - | - |
| Malaysia | 1 607 | 51 | - | - | - | - | - | - | - | - | - | - |
| Myanmar | - | - | 960 | 99 | - | - | - | - | - | - | - | - |
| Philippines | - | - | - | - | - | - | - | - | - | - | 5 381 | 119 |
| Taiwan (POC) | - | - | - | - | - | - | 7 170 | 131 | 306 | 32 | 52 464 | 354 |
| UK | - | - | - | - | - | - | - | - | - | - | 3 671 | 51 |
| USA | - | - | 22 073 | 345 | 3 057 | 50 | 7 916 | 254 | 2 730 | 194 | 10 029 | 109 |
| Other Countries | 471 | 46 | 1 004 | 63 | 755 | 63 | 514 | 31 | 425 | 43 | 1 255 | 34 |
| Total | 9 805 | 919 | 31 823 | 1 359 | 28 544 | 4 822 | 45 264 | 4 629 | 25 599 | 4 578 | 119 776 | 2 595 |
| | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | |
| Australia | 884 | - | - | - | - | - | - | - | 772 | 60 | - | - |
| Brunei Darussalam | - | - | - | - | 666 | 38 | - | - | 963 | 31 | - | - |
| France | 254 | 48 | 134 | 34 | 3 240 | 28 | - | - | - | - | - | - |
| Germany FR | 1 139 | 234 | 1 118 | 234 | 1 000 | 216 | 1 107 | 239 | 500 | 108 | - | - |
| Hong Kong | 16 177 | 233 | 14 578 | 152 | 42 707 | 389 | 2 823 | 125 | - | - | - | - |
| Italy | - | - | - | - | - | - | - | - | - | - | - | - |
| Japan | 4 787 | 1 195 | 4 281 | 1 303 | 4 585 | 735 | 1 497 | 393 | 5 649 | 274 | 1 348 | 70 |
| Malaysia | - | - | - | - | 2 072 | 76 | 4 414 | 110 | 1 098 | 50 | - | - |
| Philippines | 6 730 | 117 | 3 212 | 53 | 2 160 | 39 | 5 180 | 81 | 2 165 | 42 | - | - |
| Taiwan (POC) | 42 322 | 294 | 18 233 | 136 | 3 357 | 74 | 3 780 | 49 | - | - | - | - |
| Thailand | - | - | - | - | - | - | 11 606 | 106 | - | - | - | - |
| UK | 1 502 | 26 | - | - | - | - | - | - | - | - | - | - |
| USA | 3 793 | 57 | 6 958 | 88 | 2 547 | 35 | - | - | - | - | - | - |
| Other Countries | 2 456 | 67 | 1 381 | 37 | - | - | 4 592 | 89 | 5 542 | 40 | - | - |
| Total | 80 035 | 2 313 | 49 895 | 2 045 | 62 914 | 1 648 | 38 340 | 1 221 | 16 639 | 604 | 4 822 | 188 |

Quantity=Kilograms, Value=US \$ 1 000 FOB

Table 9 Malaysian trade statistics: shark fin, dried whether or not salted but not smoked

| Year | Imports | | Exports* | | Re-exports* | |
|-------------------|---------|-----------------|----------|-----------------|-------------|-----------------|
| | Tonnes | CIF value in Rm | Tonnes | FOB value in Rm | Tonnes | FOB value in Rm |
| 1986 ¹ | 72.57 | 797 136 | 5.16 | | | 23 075 |
| 1987 ¹ | 64.12 | 756 700 | 13.06 | | | 76 294 |
| 1988 | 53.12 | 639 187 | 1.87 | | | 32 240 |
| 1989 | 78.96 | 1 084 564 | 1.20 | | | 12 268 |
| 1990 | 89.03 | 1 168 554 | 3.72 | 49 974 | - | - |
| 1991 | 112.01 | 1 421 205 | 4.90 | 60 444 | 0.02 | 632 |
| 1992 | 209.49 | 1 877 125 | 2.16 | 71 671 | - | - |
| 1993 | 151.09 | 2 259 343 | 13.67 | 387 459 | 16.22 | 310 030 |
| 1994 | 236.10 | 1 960 405 | 5.12 | 65 532 | 12.14 | 243 630 |
| 1995 | 114.38 | 1 774 867 | 9.72 | 194 604 | 11 85 | 227 823 |
| 1996 | *823.81 | 1 769 146 | 3.52 | 153 519 | 2.97 | 130 089 |
| 01-05 | | | | | | |
| 1997 | 46.76 | 726 150 | 1.40 | 30 697 | 9.64 | 149 006 |

¹1986-1987 this item was reported as shark fin, dried, salted or in brine

²This exceedingly high figure includes 680 tonnes from Maldives and is questionable

Table 10 Malaysian trade statistics: shark fin, salted but not dried or smoked and in brine

| Year | Imports | | Exports* | | Re-exports* | |
|-------|-------------------------|-----------------|----------|-----------------|-------------|-----------------|
| | Tonnes | CIF value in Rm | Tonnes | FOB value in Rm | Tonnes | FOB Value in Rm |
| 1986 | | | | | | |
| 1987 | As Table 9 ¹ | | | | | |
| 1988 | 10.54 | 97 302 | 0.27 | | | 6 380 |
| 1989 | 5.73 | 88 026 | 0.03 | | | 500 |
| 1990 | 2.64 | 32 601 | 0.93 | 16 832 | - | - |
| 1991 | 3.16 | 19 971 | 1.06 | 8 659 | - | - |
| 1992 | 12.08 | 128 123 | 0.29 | 5 450 | - | - |
| 1993 | 13.48 | 167 221 | - | - | - | - |
| 1994 | 2.31 | 68 398 | 1.45 | 20 716 | - | - |
| 1995 | 9.02 | 97 224 | - | - | - | - |
| 1996 | 42.56 | 151 021 | 0.20 | 2 000 | - | - |
| 01-05 | | | | | | |
| 1997 | 0.93 | 35 489 | - | - | - | - |

¹1986-1987 this item was reported as shark fin, dried, salted or in brine

Table 11 Malaysian trade statistics: shark fin, preserved or prepared other than in airtight containers

| Year | Imports | | Exports* | | Re-exports* | |
|-------|---------|-----------------|----------|-----------------|-------------|-----------------|
| | Tonnes | CIF Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm |
| 1986 | 0.89 | 23 415 | 0.70 | | | 29 800 |
| 1987 | 0.54 | 12 506 | 0.27 | | | 6 380 |
| 1988 | 9.35 | 22 297 | 6.16 | | | 76 935 |
| 1989 | 6.45 | 77 430 | 10.09 | | | 177 537 |
| 1990 | 22.48 | 52 292 | 11.19 | 319 131 | - | - |
| 1991 | 8.75 | 23 493 | 10.05 | 250 675 | - | - |
| 1992 | 3.27 | 126 030 | - | - | 0.16 | 2 748 |
| 1993 | 9.30 | 35 172 | 7.67 | 182 500 | - | - |
| 1994 | 5.50 | 65 602 | 14.63 | 244 498 | - | - |
| 1995 | 1.78 | 164 301 | 8.77 | 294 125 | - | - |
| 1996 | 37.24 | 51 213 | 3.62 | 134 520 | - | - |
| 01-05 | | | | | | |
| 1997 | 0.72 | 19 195 | - | - | - | - |

*1989-1989 export figures include re-exports

Table 12. Malaysian imports of shark fins, dried, whether or not salted but not smoked

| Country of Origin | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|-------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|
| | Tonnes | Value in Rm | Tonnes | Value in Rm | Tonnes | Value in Rm | Tonnes | Value in Rm | Tonnes | Value in Rm | Tonnes | Value in Rm |
| Australia | - | - | 0.05 | 1 090 | - | - | 0.49 | 26 266 | 0.03 | 481 | 0.50 | 8 742 |
| Bangladesh | - | - | - | - | - | - | - | - | - | - | 0.25 | 3 239 |
| China PR | - | - | - | - | 0.01 | 451 | 0.05 | 770 | 0.01 | 50 | 0.03 | 1 424 |
| Hong Kong | 2.46 | 87 039 | 0.91 | 50 440 | 0.62 | 40 569 | 1.12 | 34 402 | 1.29 | 48 159 | 1.63 | 50 294 |
| India | 10.34 | 58 936 | 1.88 | 21 178 | 0.06 | 510 | - | - | 0.63 | 8 999 | 0.33 | 4 627 |
| Indonesia Rep of | 48.76 | 517 991 | 47.11 | 582 151 | 33.76 | 403 537 | 44.87 | 570 762 | 40.05 | 478 462 | 56.02 | 640 435 |
| Japan | 0.12 | 3 569 | 0.02 | 1 539 | 0.02 | 1 217 | 0.01 | 966 | 0.02 | 676 | 4.58 | 47 704 |
| Korea Rep of | 0.03 | 1 130 | 0.04 | 428 | - | - | - | - | 0.20 | 1 667 | 0.05 | 1 240 |
| Maldives | - | - | - | - | - | - | - | - | - | - | 44 | - |
| New Zealand | 0.10 | 912 | - | - | - | - | - | - | - | - | - | - |
| Philippines | 0.28 | 1 740 | - | - | 0.02 | 10 | 0.01 | 3 | 0.08 | 310 | 0.02 | 673 |
| Singapore Rep of | 8.08 | 113 555 | 9.69 | 82 547 | 17.09 | 179 728 | 31.98 | 438 095 | 42.42 | 584 570 | 47.31 | 647 312 |
| Switzerland | - | - | - | - | - | - | - | - | - | - | 0.30 | 4 121 |
| Taiwan (ROC) | 0.02 | 550 | - | - | 0.36 | 750 | - | - | - | - | - | - |
| Thailand | 2.38 | 11 714 | 4.41 | 17 307 | 1.09 | 4 973 | 0.43 | 12 060 | 3.51 | 34 182 | 0.44 | 9 805 |
| USA | - | - | 0.01 | 83 | 0.09 | 7 142 | - | - | 0.79 | 10 954 | 0.52 | 1 549 |
| Total | 72.57 | 797 136 | 64.12 | 756 700 | 53.12 | 639 187 | 78.96 | 1 084 564 | 89.03 | 1 168 554 | 112.01 | 1 421 265 |
| | | | | | | | | | | | | |
| Australia | 0.14 | 3 828 | 0.63 | 11 339 | 0.32 | 6 272 | 0.35 | 10 748 | 0.81 | 15 974 | 0.68 | 13 559 |
| Bangladesh | 0.61 | 1 041 | - | - | - | - | - | - | - | - | - | - |
| Chile | - | - | 2.25 | 7 650 | 1.54 | 3 329 | - | - | - | - | - | - |
| China PR | 0.50 | 2 534 | 0.45 | 4 509 | 0.21 | 18 176 | - | - | - | - | - | - |
| Egypt | - | - | 0.05 | 4 879 | - | - | 2.40 | 53 874 | 17.82 | 60 829 | - | - |
| Hong Kong | 0.60 | 20 710 | 0.65 | 9 916 | 4.11 | 79 869 | 0.32 | 258 421 | 3.45 | 56 270 | 5.60 | 87 070 |
| India | 0.21 | 3 089 | - | - | - | - | 0.56 | 3 921 | 1.77 | 27 413 | - | - |
| Indonesia Rep of | 129.19 | 759 462 | 37.82 | 766 067 | 159.55 | 912 760 | 40.55 | 628 144 | 71.05 | 926 750 | 13.42 | 195 032 |
| Iran IR | 0.13 | 666 | - | - | - | - | - | - | - | - | - | - |
| Japan | 6.67 | 21 533 | 3.09 | 6 470 | 1.05 | 2 268 | - | - | 1.40 | 30 697 | - | - |
| Maldives | - | - | - | - | - | - | 1.00 | 6 827 | 680.00 | 6 917 | - | - |
| New Zealand | 0.29 | 2 462 | - | - | 0.24 | 3 502 | - | - | - | 0.73 | 7 876 | 5 756 |
| Pakistan | - | - | - | - | - | - | - | - | - | - | - | - |
| Papua New Guinea | 0.17 | 2 588 | - | - | - | - | - | - | - | - | - | - |
| Philippines | 8 | 32 208 | 0.03 | 27 | 1.51 | 10 561 | 0.52 | 1 205 | 0.52 | 1 205 | 0.69 | 12 894 |
| Singapore Rep of | 69.09 | 1 045 949 | 75.50 | 1 224 307 | 68.40 | 921 380 | 57.43 | 781 857 | 38.89 | 404 808 | 25.56 | 411 839 |
| Sri Lanka Rep of | 1.66 | 11 100 | 0.66 | 3 482 | - | - | 0.72 | 6 054 | 1.38 | 14 150 | - | - |
| Thailand | - | - | 6.98 | 188 516 | 0.65 | 12 822 | 0.30 | 6 160 | 1.93 | 88 132 | - | - |
| USA | 0.23 | 2 135 | - | - | - | - | 0.44 | 6 200 | 3.93 | 21 751 | - | - |
| Yemen Rep of | - | - | - | - | - | - | - | - | 0.13 | 16 394 | - | - |
| Total | 309.49 | 1 877 125 | 151.09 | 2 259 343 | 236.10 | 1 969 405 | 114.38 | 1 774 867 | 823.81 | 1 769 146 | 46.76 | 726 159 |

Table 13 Malaysian imports of shark fins, salted but not dried or smoked and in brine

| Countries of Origin | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---------------------|--------------|-----------------|--------------|-----------------|-------------|-----------------|-------------|-----------------|--------------|-----------------|-------------|-----------------|
| | Tonnes | CIF Value in RM | Tonnes | CIF Value in RM | Tonnes | CIF Value in RM | Tonnes | CIF Value in RM | Tonnes | CIF Value in RM | Tonnes | CIF Value in RM |
| Australia | - | - | - | - | - | - | 1.43 | 24 396 | 0.03 | 829 | - | - |
| Hong Kong | - | - | - | - | 0.16 | 20 548 | 0.07 | 10 960 | - | - | - | 0.06 |
| India | - | - | - | - | 0.30 | 900 | - | - | - | - | - | 0.09 |
| Indonesia Rep of | - | - | - | - | 8.21 | 47 592 | 3.34 | 39 199 | 1.77 | 19 856 | 1.03 | 3 127 |
| Japan | - | - | - | - | 0.05 | 994 | - | - | - | - | 0.22 | 1 130 |
| Mauritius | - | - | - | - | - | - | - | - | - | 0.54 | 7 289 | - |
| Singapore Rep of | - | - | - | - | 1.81 | 27 168 | 0.85 | 12 816 | 0.30 | 4 627 | 0.08 | 1 200 |
| Sri Lanka | - | - | - | - | 0.01 | 100 | 0.04 | 655 | - | - | - | 1.68 |
| Thailand | - | - | - | - | 10.54 | 97 302 | 5.73 | 88 026 | 2.64 | 32 601 | 3.16 | 19 971 |
| Total | | | | | | | | | | | | |
| | | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 |
| China PR | - | - | 0.06 | 19 944 | - | - | - | - | - | - | - | - |
| Fiji | 0.15 | 3 730 | - | - | - | - | - | - | - | - | - | - |
| Hong Kong | - | - | - | - | 0.35 | 4 193 | - | - | - | - | - | - |
| India | 8.44 | 83 168 | - | - | - | - | 1.26 | 27 730 | - | - | - | - |
| Indonesia Rep of | 1.64 | 15 887 | 0.20 | 2 745 | 0.37 | 19 894 | 7.71 | 69 404 | 10.84 | 87 691 | 0.04 | 5 282 |
| Japan | 1.60 | 19 373 | 1.45 | 16 313 | - | - | - | - | 20.00 | 8 471 | 0.05 | 8 456 |
| Mauritius | - | - | - | - | - | - | - | - | 10.80 | 41 029 | - | - |
| New Zealand | 0.05 | 1 183 | 2.22 | 18 870 | - | - | - | - | - | - | - | - |
| Philippines | - | - | 8.65 | 102 402 | - | - | 0.05 | 90 | 0.22 | 6 807 | 0.40 | 8 547 |
| Singapore Rep of | 0.20 | 4 782 | 0.90 | 6 947 | 1.51 | 41 686 | - | - | - | - | 0.43 | 13 204 |
| Sri Lanka | - | - | - | - | - | - | - | - | 0.70 | 7 023 | - | - |
| Thailand | - | - | - | - | 0.08 | 2 625 | - | - | - | - | - | - |
| Total | 12.08 | 128 123 | 13.48 | 167 221 | 2.31 | 68 398 | 9.02 | 97 224 | 42.56 | 151 021 | 0.92 | 35 489 |

1986/1987 reported as shark fins dried whether or not salted but not smoked (see Table 12)

Table 14 Malaysian imports of shark fins

| Country of Origin | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | | |
|-------------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|-------|
| | Tonnes | CHF Value in Rm | Tonnes | CHF Value in Rm | Tonnes | CHF Value in Rm | Tonnes | CHF Value in Rm | Tonnes | CHF Value in Rm | Tonnes | CHF Value in Rm | |
| Australia | - | - | - | - | - | 47 680 | - | - | - | - | - | - | |
| China PR | - | - | - | - | - | - | 0.01 | - | 0.01 | 500 | - | - | |
| Hong Kong | 0.22 | 5 129 | - | - | - | 4 035 | - | 0.23 | 4 035 | - | 0.09 | 1 850 | |
| India | - | - | - | - | - | - | - | - | - | 1.48 | 2 654 | - | |
| Indonesia Rep of | - | - | - | - | 6.87 | 12 985 | - | 2.63 | 17 685 | 12.61 | 26 613 | 4.62 | 9 029 |
| Japan | 0.01 | 450 | 0.01 | 209 | 0.01 | 60 | - | 0.23 | 432 | 7.66 | 14 002 | 3.83 | 7 014 |
| Korea Rep of | 0.01 | 723 | - | - | - | 180 | - | - | - | - | - | - | - |
| Philippines | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Singapore Rep of | 0.65 | 17 113 | 0.52 | 11 836 | 0.27 | 5 436 | 0.43 | 3 824 | 0.13 | 1 937 | 0.01 | 600 | |
| Taiwan (POC) | - | - | - | - | - | - | 0.01 | 874 | - | - | - | - | - |
| Thailand | - | - | 0.01 | 461 | 2.20 | 3 636 | 0.06 | 2 900 | 0.59 | 6 586 | 0.20 | 5 000 | |
| Total | 0.89 | 23 415 | 0.54 | 12 506 | 9.35 | 22 297 | 6.45 | 77 430 | 22.48 | 52 292 | 8.75 | 23 493 | |
| | | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | Jan-Jun 1997 | |
| Australia | - | - | 0.40 | 8 104 | 2.51 | 13 342 | - | - | - | - | - | - | |
| China PR | - | - | - | - | 0.36 | 5 129 | - | - | 35.60 | 5 036 | - | - | |
| Hong Kong | - | - | - | - | 0.24 | 4 167 | - | - | - | - | - | - | |
| Indonesia Rep of | 0.99 | 72 126 | 0.21 | 3 268 | 0.11 | 3 300 | - | - | 0.64 | 13 726 | 0.23 | 6 687 | |
| Japan | 0.86 | 6 912 | 1.49 | 3 195 | - | - | - | - | - | - | - | - | |
| Philippines | - | - | - | - | - | - | - | - | - | - | - | - | |
| Singapore Rep of | 1.00 | 15 212 | 7.20 | 20 605 | 2.28 | 39 664 | 1.48 | 57 801 | 1.00 | 32 451 | 0.24 | 6 220 | |
| Taiwan (POC) | - | - | - | - | - | - | 0.30 | 106 500 | - | - | - | - | |
| USA | 0.42 | 31 780 | - | - | - | - | - | - | - | - | - | - | |
| Total | 3.27 | 126 030 | 9.30 | 35 172 | 5.50 | 65 602 | 1.78 | 164 301 | 37.24 | 51 213 | 7.20 | 19 195 | |

Table 15 Malaysian exports of shark fin dried whether or not salted but not smoked

| Country of Destination | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|------------------------|-------------|-----------------|--------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|---------------------|
| | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm |
| Australia | - | - | - | - | - | - | 0.04 | 480 | 0.10 | 3 200 | 0.14 | 1 296 |
| Brunei Darussalam | 0.15 | 2 040 | 0.36 | 7 192 | - | - | - | - | - | - | - | - |
| Hong Kong | 0.47 | 5 006 | 1.22 | 12 466 | 0.01 | 5 000 | 0.15 | 5 064 | - | 2 700 | 0.37 | 5 815 |
| Japan | - | - | - | - | 0.01 | 1 540 | - | - | - | - | 0.05 | 3 373 |
| Korea Rep of | - | - | - | - | - | - | 0.10 | 2 040 | 0.20 | 4 000 | 0.08 | 2 240 |
| Singapore Rep of | 4.54 | 16 029 | 11.47 | 56 516 | 0.82 | 21 660 | 0.87 | 3 484 | 0.16 | 3 666 | 1.48 | 7 280 |
| Switzerland | - | - | - | - | - | - | - | - | - | - | - | - |
| Taiwan (POC) | - | - | - | - | 1.03 | 8 540 | 0.04 | 1 200 | - | 238 | - | - |
| Thailand | - | - | - | - | - | - | - | - | 3.18 | 36 170 | 2.78 | 40 440 |
| USA | - | - | 0.01 | 120 | - | - | - | - | - | - | - | - |
| Total | 5.16 | 23 075 | 13.06 | 76 294 | 1.87 | 32 240 | 1.20 | 12 268 | 3.72 | 49 974 | 4.90 | 60 444 |
| | | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | Jan-Jun 1997 |
| Brunei Darussalam | 0.71 | 15 078 | 0.20 | 6 000 | - | - | - | - | - | - | - | - |
| Hong Kong | 0.01 | 1 045 | 9.01 | 280 659 | 1.87 | 27 326 | - | - | 0.50 | 6 930 | - | - |
| Japan | 0.01 | 1 386 | - | - | - | - | - | - | - | - | - | - |
| Korea Rep of | 0.12 | 2 400 | 0.11 | 2 000 | 0.59 | 12 750 | - | - | - | - | - | - |
| Myanmar | - | - | - | - | - | - | 7.14 | 107 100 | - | - | - | - |
| Singapore Rep of | 0.89 | 8 839 | - | - | 2.66 | 25 456 | 0.02 | 1 000 | - | - | - | - |
| Thailand | - | - | - | - | - | - | 1.24 | 49 382 | 2.96 | 129 945 | 1.40 | 30 697 |
| U Arab Emirates | - | - | 4.35 | 98 800 | - | - | 0.32 | 5 122 | - | - | - | - |
| USA | 0.42 | 42 923 | - | - | - | - | - | - | - | - | - | - |
| Vietnam SR | - | - | - | - | - | - | 1.00 | 32 000 | 0.05 | 16 500 | - | - |
| Other Countries | - | - | - | - | - | - | - | - | - | 0.01 | 144 | - |
| Total | 2.16 | 71 671 | 13.67 | 387 459 | 5.12 | 65 532 | 9.72 | 194 604 | 3.52 | 153 519 | 1.40 | 30 697 |

Table 16 Malaysian exports of shark fin salted but not dried or smoked and in brine

| Country of Destination | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|------------------------|-------------|-----------------|--------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm |
| Australia | | | | | - | - | - | - | 0.30 | 7 280 | - | - |
| Brunei Darussalam | | | | | - | - | 0.03 | 500 | 0.05 | 250 | - | - |
| Hong Kong | | | | | - | - | - | - | 0.58 | 9 302 | - | - |
| Singapore Rep of | | | | | 0.24 | 5 720 | - | - | - | - | 1.01 | 8 104 |
| Switzerland | | | | | - | - | - | - | - | - | 0.05 | 555 |
| Taiwan (POC) | | | | | 0.03 | 660 | - | - | - | - | - | - |
| Total | | | | | 0.27 | 6 380 | 0.03 | 500 | 0.93 | 16 832 | 1.06 | 8 659 |
| | | | | | 1992 | | 1993 | | 1994 | | 1995 | |
| Brunei Darussalam | - | - | - | - | - | - | - | - | 0.20 | 2 000 | - | - |
| Hong Kong | - | - | - | - | 0.25 | 2 356 | - | - | - | - | - | - |
| Korea Rep of | 0.15 | 3 000 | - | - | - | - | - | - | - | - | - | - |
| Singapore Rep of | 0.14 | 2 450 | - | - | 1.20 | 18 360 | - | - | - | - | - | - |
| Total | 0.29 | 5 450 | - | - | 1.45 | 20 716 | - | - | 0.20 | 2 000 | - | - |
| | | | | | | | | | | | | 1997 01-05 |

Table 17 Malaysian exports of shark fin

| Country of Destination | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|------------------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|
| | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm | Tonnes | FOB Value in Rm |
| Australia | 0.20 | 4 800 | - | - | - | - | - | - | - | - | - | - |
| Brunei Darussalam | - | - | - | - | - | - | 0.01 | 480 | - | - | - | - |
| Canada | - | - | - | - | - | - | 0.97 | 16 912 | - | - | - | - |
| Germany FR | - | - | - | - | 0.24 | 2 839 | - | - | - | - | - | - |
| Hong Kong | 0.50 | 25 000 | - | - | - | - | - | - | - | - | - | - |
| Korea Rep of | - | - | - | - | - | - | 2.67 | 65 900 | 10.22 | 254 250 | 9.67 | 241 375 |
| Sierra Leone | - | - | - | - | - | - | - | - | 0.10 | 573 | - | - |
| Singapore Rep of | - | - | - | - | 0.13 | 3 604 | 0.01 | 379 | - | - | 1.01 | 8 104 |
| Switzerland | - | - | - | - | - | - | - | - | - | - | 0.05 | 555 |
| Thailand | - | - | - | - | - | - | 0.03 | 430 | - | - | - | - |
| UK | - | - | - | - | 0.12 | 7 115 | - | - | - | - | - | - |
| USA | - | - | - | - | 5.67 | 63 341 | 6.25 | 92 959 | 0.87 | 64 308 | - | - |
| O.C.Africa | - | - | - | - | - | - | 0.15 | 477 | - | - | - | - |
| Total | 0.70 | 29 800 | - | - | 6.16 | 76 935 | 10.09 | 177 537 | 11.19 | 319 131 | 10.73 | 250 034 |
| | | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 |
| Brunei Darussalam | - | - | - | - | 0.09 | 6 846 | - | - | - | - | - | - |
| Hong Kong | - | - | - | - | 1.00 | 4 988 | - | - | - | - | - | - |
| Indonesia | - | - | - | - | 0.30 | 106 500 | - | - | - | - | - | - |
| Korea DPR | - | - | - | - | - | - | - | - | - | - | 0.38 | 9 500 |
| Korea Rep of | - | - | 6.35 | 154 600 | 13.08 | 222 750 | 8.47 | 187 625 | 3.52 | 99 020 | 9.67 | 241 375 |
| Sierra Leone | - | - | - | - | - | - | - | - | - | - | - | - |
| Singapore Rep of | - | - | 1.14 | 27 900 | 0.46 | 9 914 | - | - | - | - | - | - |
| Taiwan (POC) | - | - | - | - | - | - | - | - | 0.10 | 35 500 | - | - |
| Total | - | - | 7.49 | 182 500 | 14.63 | 244 498 | 8.77 | 294 125 | 3.62 | 134 520 | 10.05 | 250 875 |

Sawing vertebral off the caudal fin of the Blue shark.



Photo 2.1

Display of "raw" fins in a retail outlet.



Photo 2.2

Decorations in restaurants using "cooked" and "raw" fins.



Photo 2.3

Product: Dried pectoral fins
Name: Basking shark
(*Cetorhinus maximus*)
Price: US\$1-1,650/ Kg for 4 piece set
(3'-5' pectoral fin)



Photo 3.1

Product: Dried pectoral, first dorsal and caudal fins.

Name: Black tipped shark
(*Carcharinus limbatus*)

Price: US\$100/ Kg for 4 piece set
(13" pectoral fin)



Photo 3.2

Product: Dried caudal fin
Name: Blue Shark
(*Prionace glauca*)
Price: US\$65-85/ Kg for 4 piece set
(18"-30" pectoral fin)



Comment: The vertebral column in the caudal fin is large and is usually sawed off by the importers before it is offered for sale. The percentage yield of fin needles is low and they are generally considered as being of inferior quality. It is popular because it is comparatively inexpensive.



Photo 3.3

Product: Dried pectoral, first dorsal and caudal fins

Name: Hammerhead shark
(*Sphyrna* spp.)

Price: US\$ 70/ Kg for 4 piece set
(14" pectoral fin)



Photo 3.4

Product: Dried pectoral fins
Name: Mako shark
(*Isurus oxyrinchus*)
Price: US\$ 70/ Kg for 4 piece set
(14" pectoral fin)



Photo 3.5

Source: The Complete Book of Dried Seafood & Foodstuffs

Product: Dried pectoral fins
Name: Ryukyu shark
Price: US\$75/ Kg for 4 piece set
(13" pectoral)



Photo 3.6

Product: Dried dorsal fin
Name: Sandbar Shark
(*Carcharhinus plumbeus*)
Price: US\$ 100/ Kg for 3 piece
set

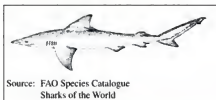


Photo 3.6

Product: Dried first dorsal, second dorsal and caudal fins

Name: Shovel-nose ray
(*Rhinobatos djiddensis*)

Price: US\$30-120/ Kg for 3 piece set
(4"-14" pectoral fin).

Comment: This is one of the most popular and known fins in Malaysia. It is reputed to produce thick and long fin needles with a pleasing texture.



Photo 3.8

Product: Dried pectoral fins
Name: Tiger shark
(*Galeocerdo cuvier*)
Price: US\$ 70/ Kg (14" pectoral fin)



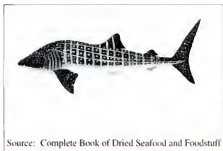
Photo 3.9

Source: The Complete Book of Dried Seafood & Foodstuff

Product: Dried caudal fin

Name: Whale shark
(*Rhiniodon typus*)

Price: US\$230-265/ Kg for 4 piece
set
(36"-48" Pectoral fin)



Source: Complete Book of Dried Seafood and Foodstuff



Photo 3.10

Source: The Complete Book of Dried Seafood & Foodstuffs

Product: Fish lips, dried. A glamorized name given to sharks' skin taken from the upper lobe of the caudal fin after removal of the denticle.

Price: US\$27/ Kg retail

Comments: A product known and used in dishes in its own right. Now increasingly used to cook in sharks' fins dishes to increase the volume and reduce the cost.

Decasled shark's skin from the upper lobe

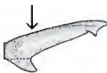


Photo 4.1

Product: Cartilaginous platelet of sharks fin, dried

Price: US\$ 12.50 - US\$ 45.80/ Kg retail depending on the appearance e.g. level of bleaching etc.

Comment: A by-product of the cleaning process of sharks' fins. Considered a waste material during the times of plenty, it has now found its way onto the dining table. The claim that shark cartilage is beneficial to health creates an awareness in the health conscious.



Photo 4.2

Shark fins, "cooked"

Price: US\$50-60/ Kg retail (2" caudal)

Comment: This product is most likely a mixture of small size fins from different species.

It is difficult to remove denticle from small fins. The processing loss is also high. Often the processing cost of small fins is higher than the raw material cost. Therefore small fins are becoming less popular with processors.

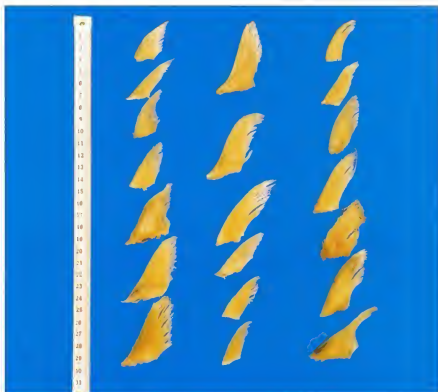


Photo 4.3

Product: Shark fin needles, dried in random order

Price: US\$9/ pack retail

Comment: The product is wrapped in clear cellophane paper, with a label indicating the name of the packer/ distributor. No other information including weight is given

The product weighs 25gm, thus making the price US\$360/ Kg.



Photo 4.4

Product: Shark fin needles, dried in rows

Price: US\$ 32/ pack retail

Comment: Only the top layer is arranged neatly as shown. The layers below appeared to be fish skin (fish lips) rather than fin needles. No net weight is stated on the cellophane wrapped product.

It weighs 150 g, thus making it US\$213/ Kg



Photo 4.5

Product: Shark fins, frozen
Price: US\$ 107/ Kg retail
The piece shown is 28.4gm

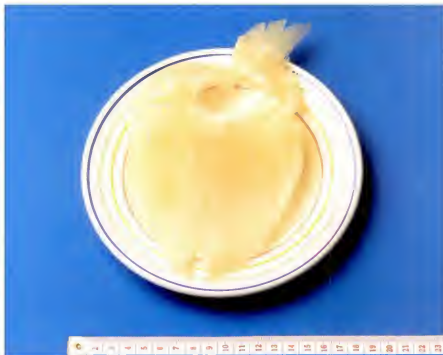


Photo 4.6

Product: Shark fin soup, powdered

Price: US\$ 2.15/ 51gm pack retail

Comment: The uncooked product was powdery. The picture on the box is not representative of the contents.



Photo 4.7

Product: Shark fin soup, canned (products of Singapore)

Price: Retail price from left

1. Sharks' fins soup: US\$2.70/ 450gm can
2. Sharks' fins soup for export to Japan, label to be affixed in Japan: US\$10/ 450gm can
3. Refined sharks' fins: US\$7/ 450gm can
4. Sharks' fins soup: US\$3.45/ 450gm can
5. Superior sharks' fins soup: US\$19.45/ 230gm glass bottle packed in an outer plastic container. A similar pack with much smaller fin-bundles is US\$14.45/ 230gm pack

- Comments:**
1. A thick soup containing 10gm of individual fin needles, a hint of crab meat and some thin slices of Chinese mushrooms. Quantitatively, the picture on the label is not representative of the contents.
 2. A light saline solution containing 180gm of approximately 1.5 cm long fin needles in bundles.
 3. A thick soup containing 30gm of long individual fin needles. Quantitatively, the picture on the label is not representative of the contents.
 4. A thick soup containing 20gm of individual fin needles, crab meat and chopped Chinese mushrooms. Quantitatively, the picture on the label is not representative of the contents.
 5. A light soup base containing 20gm of approximately 6-8 cm long fin needles in bundles.



Photo 4.8

Product: Shark fin dishes, pouched
(processed and packed in Thailand for a Malaysian company)

Price: Retail prices as follows:

Sharks' fins soup with mushroom: US\$ 7.30/ 210gm pack

Sharks' fins soup with seafood: US\$ 8.70/ 210gm pack

Braised superior sharks' fins: US\$16.60/ 340gm pack

Comments: Both the 210gm packs contain sharks' fins of the very short and fine variety. The 340gm pack contains small fin needle bundles. Quantitatively, the pictures shown on the boxes do not justify the contents. (no Weight checks were conducted.)



Photo 4.9

Product: Shark fins and "Shishamo" fish roe sashimi and sushis

Price: Sashimi: US\$3.25/ 100gm

Sushi: US\$ 0.50/ piece

Comments: The attractive fin needles and fish roe come from Japan.



Photo 4.10

APPENDIX IV.3
THE INDIAN SHARK INDUSTRY
 by R.A.M. VARMA

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1 RESOURCES

India is rich in natural resources. Its surrounding seas, the Arabian Sea to the west, the Bay of Bengal on the east and the Indian Ocean to the south, abound in a wide range of commercially important fishes and other marine animals. With a coastline of about 7 000 km and 2.02 million square kilometres of water in the exclusive economic zone [EEZ], the annual harvestable fishery potential of the country is estimated to be 3.48 million tonnes. The present level of exploitation of the resources is about one third of the potential.

On the basis of the available landing figures compiled by the Central Marine Fisheries Research Institute, the Fishery Survey of India and commercial fishing results, potential resource data is shown in Table 1.

Table 1 Marine fish resource potential of India's EEZ (1 000 tonnes)

| DEMERSAL | | PELAGIC | |
|--|------|----------------|------|
| Sharks/skates/rays | 120 | Oil sardine | 160 |
| Eels | 10 | Other sardine | 90 |
| Catfish | 120 | Whitebait | 90 |
| Lizard fish | 45 | Other clupeids | 150 |
| Perches | 230 | Bombay duck | 125 |
| Sciaenids | 210 | Ribbonfish | 245 |
| Silver bellies | 75 | Carangids | 275 |
| Pomfrets | 60 | Mackerel | 190 |
| Flat fishes | 50 | Seerfish | 40 |
| Penaeid prawns | 175 | Tuna [coastal] | 100 |
| Non-penaeid prawns | 65 | Other | 60 |
| Cephalopods | 145 | TOTAL | 1525 |
| Priacanthus | 55 | | |
| Black ruff | 10 | | |
| Deep sea prawns/lobsters | 10 | | |
| Other | 255 | | |
| TOTAL | 1635 | | |
| Tuna and other varieties around Andaman, Nicobar & Lashadeep islands | | 320 | |
| GRAND TOTAL | | 3480 | |

The annual production of elasmobranchs in India is around 70 000 tonnes, over 4% of total marine fish landings. Sharks account for between 60 and 70% of this. Tamil Nadu, Gujarat, Maharashtra, Kerala Karnataka and Andhra Pradesh supply around 85% of the shark landings in India. Sixty-five species of shark have been sighted in Indian waters and over 20 of these, of the Carcharhinidae and Sphyrnidae families, contribute to the fishery.

Sharks are of great commercial importance world over, apart from being a significant link in the marine ecology. In India the present annual shark production is around 45 500 tonnes, obtained as a by-catch from a variety of gears. Despite the commercial importance, no serious attempts have so far been made at any targeted exploitation of this valuable resource. Information on the composition of the species of shark landings is very scarce apart from the gross catch statistics.

There are several types of gear that take sharks as incidental catch; the most important among them are trawl net and gill net. There is no detailed information on the landings of sharks by gear type but data available on shark production by mechanized boats at major fishing centres show that trawl nets account for 60% of the shark landings and gill nets account for 38%. Purse seine in Cochin and Mangalore and hook-and-line in Cochin and Bombay take a very small fraction of the catch.

New Ferry Wharf and Sassoon Docks in Bombay, Pudumanai Kuppam in Andhra Pradesh, Tuticorin in Tamil Nadu and Veraval in Gujarat are centres of good landings by trawl net and gill net. Shakhthilangara and Cochin in Kerala are centres for gill net landings.

2 SPECIES AND BIOLOGY OF INDIAN SHARKS

Sharks of the family Carcharhinidae are the most important group, dominating the fishery all over the world, and this applies equally in India. The following species are commonly reported on the Indian coasts.

2.1 *Carcharhinus limbatus*

This shark is cosmopolitan in distribution in the inshore regions of tropical waters. It is capable of tolerating reduced salinity but never penetrates into fresh water. Its main diet is fish such as sardine, mackerel, croaker and sole with cephalopods and crustaceans. It grows to a maximum size of 2.5m. Males mature at 140-150cm and females at 150-160cm. They produce an average of 6 embryos per litter and the size at birth is 55-60cm. They are usually caught by gill net, hook-and-line or bottom-set net.

2.2 *Carcharhinus sorrah*

This shark often frequents coral reefs. It is short and sturdy and grows to about 1.5m. It feeds on bony fish such as mackerel and sardine plus squid and prawns. Males mature at 115cm and females at 120cm. Litter size is 2-6 delivered between March and May on the Indian coast. The size at birth is 40cm.

2.3 *Carcharhinus dussumieri*

A small, common species of shark in inshore waters, often confused with another closely resembling species, *c.sealei*. It feeds on small fish, squid and crustaceans. It grows up to 1m; males maturing at 65cm and females at 76cm. Size at birth is 35cm. It breeds throughout the year and has a litter of two embryos.

2.4 *Carcharhinus melanopterus*

This Indo-pacific tropical shark is capable of migrating into estuaries and brackish waters for the purpose of delivering its pups. It can grow up to 2.5m. The umbilical scar is visible on young ones immediately after delivery. They are 45-50cm at birth. Its feed includes fish such as mullet, silver bellies, anchovies, hilsa, skate, prawns and squilla. It is commonly caught by drift gill net and long line.

2.5 *Carcharhinus macloti*

A small shark which grows to a little over 1m in length. It is caught by gill net or hook-and-line and marketed fresh and salt-dried. Its diet consists of small fish, crustaceans and squid. Males mature at 60cm and females at 70cm producing 2 young ones per litter which measure up to 35cm.

2.6 *Galeocerdo cuvier*

The largest shark of this type recorded measured 7.4m. A widely distributed tropical shark, it is capable of cruising in mid ocean and shows nocturnal movement into bays and estuaries. Its food includes a wide variety of marine and terrestrial life. Fish such as eels, catfish, parrot fish, flat fish, flat heads, flying fish, porcupine fish, puffers, skates and rays are taken. Marine reptiles eaten are sea turtles, green logger heads and Ridley turtles. Sea snakes, sea birds, sea lions, seals and dolphins are also eaten. This shark, known as the tiger shark, is very dangerous and attacks divers, swimmers and fishing boats. It has the worst reputation as a man-eater. Development is ovoviviparous, the

litter size is very large, between 10 and 82, and size at birth is 50-75cm. Pupping is reported to be between November and January.

2.7 *Scoliodon laticaudus*

This shark abounds on the west and south coasts of India. The majority of males grow to 50-55cm and females to 65cm. The species is mainly caught by trawling. Those caught in drift gill nets are females measuring over 50cm. Males and females mature at 30cm and 35cm respectively. Development is viviparous with yolk-sac placenta. Breeding takes place throughout the year and produces up to 20 embryos per litter. Size at birth is 14.5cm. It feeds on small fish, crustaceans and squid.

2.8 *Rhizoprionodon acutus*

A medium sized shark in the shore regions which grows to a little over 1m. It is abundant on the west coast of India from September to February and on the east coast during the summer months. It feeds on all small fish, squid, cuttlefish, crab and shrimp. Development is viviparous with yolk-sac placenta. There are 2-6 embryos per litter which are 26-27cm long.

2.9 *Sphyrna lewini*

This is the most common hammerhead shark inhabiting the Indian seas. The species is highly migratory in nature. It feeds on fish such as sardine, anchovies, mackerel, eel, milk fish and sole. Even sharks and rays are eaten. Development is viviparous with yolk-sac placenta and a litter of 15-30 embryos. The size at birth is 45-55cm and it can grow up to 4.2 m.

The other major species contributing to Indian fisheries are *Rhizoprionodon oligolinx*, *Isurus oxyrinchus*, *Sphyrna blochii*, *Sphyrna mokarran*, *Rhynchobatus djiddensis*, *Rhinobatos granulatus*, *Rhina onychostomo*, *Dasyatis sephen*, *Dasyatis uarnak*, *Dasyatis imbricatus*, *Dasyatis marginatus*, *Himantura alcockii*, *Aetobatus narinari*, *Atomomyloes niehofii*, *Atomomylopus maculatus*, *Rhinoptera javanica*, *Gymnura poecilura* and *Mobula diabola*. Whale shark and cat shark also appear occasionally.

Work on the biology of Indian sharks is very insignificant and this is probably because of the difficulty in getting adequate samples. As there is no regular fishery for sharks, their availability is only incidental. The unwieldy size of many species may also be a contributory factor in this regard. More than one hundred works on elasmobranchs have been published in India but only two or three deal with their age and growth. The rest are mainly faunal and taxonomic studies with just some isolated biological details of a few species.

Since whatever is obtained as bycatch is a multi-species catch of sharks in a multi-gear fishery, no serious effort has been made to assess the catch composition or estimates of landings by species on an all-India basis. Given also the inadequate information on the biology of the species, especially its growth characteristics, these factors explain the lack of attempt to study population dynamics.

3 SHARK PRODUCTS AND PREPARATION TECHNIQUES

3.1 Shark meat for human consumption

Small species of sharks are used for preparing shark meat. The fish is not filleted and the preparation is limited to removal of guts, fins, skin and head.

Equipment

- Cutting board made of hard wood
- Large, broad-bladed and straight-edged knife
- 'S' hook secured to the edge of the cutting board
- A pair of pliers

Procedure

- Wash the fish in fresh running water to remove slime and dirt.
- Place the fish on the cutting board and cut open the belly.
- Cut across the throat in front of the pectoral fin girdle and remove the viscera from the belly.
- Cut open along the mid-ventral line to beyond the pelvic fins.
- Turn the fish over and cut off the dorsal fins and tail.
- Skinning: firmly fix the head on the 'S' hook with the dorsal surface up, firmly grip the belly flap and the base of the pectoral fins and pull back towards the tail until the skin comes off completely.
- Remove the fish from the hook. Cut from the dorsal surface behind the gills and remove the head.
- The end product thus obtained is shark meat which is washed thoroughly and packed either fresh or frozen according to the requirements of the customer.

This technique is not applicable in the case of large sharks as their bodies have first to be cut into manageable pieces before peeling the skin. Usually the meat is packed, fresh or frozen, as chunks.

3.2 Shark hide for the tanning industry

A special feature of shark is the surface of the skin known as 'shagreen' which is a rough leather with dermal denticles embedded in the skin, used for rasping and polishing. A rare and expensive product known as Boroso leather can be obtained by polishing the denticles to a high gloss. The hide can also be converted into a fancy leather by removing the dermal denticles. This leather can be used for shoes and other value-added products such as wallets, dress belts, hand-bags and purses. Skins can generally be produced from sharks without damaged skin, which exceed 1.5m in length. The operation of skinning and salting must not take more than 24 hours. Sharks meant for skinning should not be gutted, iced or frozen beforehand. Fresh water will spoil the skin so only seawater should be used for washing.

Procedure

1. Skinning or flaying

Shark is generally skinned on a platform, usually on the deck of a fishing boat. It can also be done by suspending the fish from a hook through the upper jaw or with the carcass lying belly down on the ground. A large and very sharp knife is used for the operation.

- Cut off all the fins except the tail.
- Insert the knife in the holes already made by the removal of the dorsal fins and cut forward to the upper front of the head and back to the knob near the tail.
- Cut off the tail just in front of the knob.
- Cut around the head, behind the gills and pectoral fins, then ventrally and forward around the edge of the lower jaw.
- Pull off the skin gently by freeing it from the carcass with the knife kept flat against the skin from the head towards the tail.
- To avoid 'sour spots' i.e. areas of tissue breakdown, skinning must be done within 30 minutes.

2. Soaking

- Wash the skin with seawater immediately after skinning to remove blood and slime. Washing with a hose is preferable.
- Immerse the washed skin in a 6% brine solution for 3-4 hours to facilitate fleshing.

3. Fleshing

- Fleshing is the removal of the residual tissue from the fleshy side of the skin after flaying. It is carried out with a 'beaming knife' and a stout 'beaming board'. The beaming knife is a 40cm long, curved steel blade having a single edge and a handle at each end. A beaming board is made of hard wood and measures 1m wide by 1.5m long with a curvature across the width which matches that of the beaming knife.
- After fleshing the tail end of the skin is split by cutting around the ventral fin rudiments and vent and through the hole left by the anal fin.

4. Curing

- Immediately after fleshing, the skin is washed with seawater and drained for 10 minutes.
- Mineral salt is applied generously [about one third of skin weight] on the fleshy side and extra salt is rubbed along the cut edges. Salt must be neither powdered nor too coarse in nature.
- Lay the salted skins flat, one on top of the other, flesh side up with ample salt between each layer on a sloped platform so that the brine can drain away. The pile should not exceed 1.5m in height. The stacked skins must remain in this condition for a maximum period of 5 days. Complete protection from sun and direct sunlight must be maintained during this time.

5. Folding and storage

- At the end of the curing period the salted skins are removed one by one.
- The residual salt is shaken off from the cured skins and fresh salt is applied on the flesh side of the skin.
- The skins are folded with the flesh side inwards to prevent loss of salt, rolled into bundles and tied with twine.
- The bundled, cured skins are stored in a clean dry storage place after it has been disinfected with insecticides and fungicides.

3.3 Shark fins for soup

Large, edible species of sharks are used to obtain suitable fins. In India the fins of the following four species are usually collected for export:

- Hammerhead/round headed shark, *Sphyrna zygaena*
- Grey dog shark, *Rhizoprionodon acutus*
- Sharp-nosed/yellow dog shark, *Scoliodon laticaudus*
- Black-finned/black tip shark, *Carcharhinus melanopterus*

Equipment

- Wooden cutting board
- Large, broad-bladed, straight-edged knife

Procedure

- Wash the fish in running water to remove slime and dirt.
- Cut and remove the pectoral and pelvic fins on both sides.
- Cut and remove the dorsal fin and the tail.

- Remove the adhering flesh on the cut fins and washed them thoroughly in fresh water.
- Add salt to the fins in the ratio 10:1. Give the cut-sides of the fins a liberal sprinkling of salt and then apply a little lime. Leave the fins for 24 hours.
- Sun-dry the fins on clean mats until the desired level of 7-8% moisture is obtained.
- The fins are then packed, stored and exported according the buyers' specific requirements.

3.4 Shark fin rays for soup

Fresh and dried fins of edible sharks can be used for extracting the rays.

Procedure

- Soak shark fins in clean fresh water, acidified to pH 2.5-5.0 with acetic acid for 48 hours.
- Scrape off the shagreen and continue soaking for 72 hours for fresh/raw fins and 120 hours for dried fins. The soaking is done to soften the fins.
- For over-dried/long-stored dry fins, heat the softened fins together with 10% acetic acid for 60 minutes.
- Separate the rays manually from the loosened flesh if individual rays are required and wash thoroughly in cold fresh water. In the case of tiny fins, the rays can be separated by gentle agitation using a mechanical stirrer.
- Dry the fin rays thus separated in the sun on mats spread on clean raised cement platforms until a moisture content of 5-8% is attained.
- Remove the dried fin rays from the sun and keep in shade for 30-60 minutes.
- Pack convenient quantities of dried fin rays in polyethylene bags.
- Store the dried shark fin rays in a dry, clean area.

3.5 Shark liver oil

Shark liver oil is used in the tanning and textile industries, as a lubricant and also as a rich source of vitamin A. The livers weigh 10-25% of the shark's body weight and contain 60-70% oil. Indian sharks contain 2 to 180kg of liver depending upon size, season etc.

The easiest method of extracting shark liver oil is to mince the livers and boil them with water in suitable containers. When the oil floats to the surface it is ladled off.

A more efficient method of extracting shark liver oil is by digesting the chopped livers with 1-2% by weight of sodium hydroxide or 2-5% of sodium carbonate at 82-85°C. During the operation continuous stirring is required. This method results in the dissolution of all proteinaceous matter and complete release of the oil. The oil is then separated using a centrifuge.

The oil is stored in barrels. For pharmaceutical grade shark liver oil the material is purified and bottled.

4 SHARK EXPORTS AND PRICES

Table 2 Shark exports: value and countries of destination

| Product | Countries of destination | 1995-96 | | 1996-97 | |
|-------------------|--------------------------|-----------------|----------------------|-----------------|----------------------|
| | | Quantity Tonnes | Value million rupees | Quantity Tonnes | Value million rupees |
| Frozen shark meat | Hong Kong Singapore | 584 | 18.3 | 142 | 4.9 |
| Dried shark fins | Hong Kong Singapore | 369 | 119.3 | 244 | 90.0 |
| Shark bones | | negligible | | | |
| Shark liver oil | | negligible | | | |
| Shark fin rays | | negligible | | | |

Table 3 Prices of shark products in rupees per kilogram

| Product | Minimum | Maximum |
|------------|---------|---------|
| Shark meat | 25 | 30 |
| Shark fins | 280 | 340 |
| Shark bone | 70 | 75 |

There exists considerable scope for substantially increasing the volume of India's exports of shark products but no sustained, concerted efforts have been made to reach the maximum sustainable yield of this fishery.

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- The Central Institute of Fisheries Technology [CIFT]

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- Dr Lekshminarayan, Senior scientist, CMFRI
- Mr VK Dey, MPEDA
- Mr Jagdish MPEDA
- A few technocrats associated with fisheries and fishery-related activities.

APPENDIX IV.4
INVESTIGATION ON SHARK UTILIZATION IN CHINA
by INFOYU

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1 INTRODUCTION

1.1 The shark study

Shark fisheries are attracting increasing worldwide interest and concern, particularly regarding the trade in shark products and their impact on shark stocks. To understand the situation of shark fisheries in China, INFOYU undertook a study from November 1998 to January 1999 focusing on shark catches, imports, exports, consumption and distribution in China.

A group of seven from INFOYU, Bureau of Fisheries, CITES Management Authorities of China, China Academy of Fisheries Sciences, China National Fisheries Technology Extension Centre and Fujian and Guangdong Provincial Fisheries Bureau collected and compiled available information and data. The China Fishery Scientific Information Databank was searched for information and publications. From 25 November to 25 December 1998 a local survey of catches, processing and consumption in Guangdong, Fujian and Guangxi provinces was arranged through the local Fishery Bureau. From 7 December to 25 December 1998, the group made a two-week field visit to Guangdong province in order to survey shark fin processing, marketing and consumption and shark catches. The information gathered was analysed by the group, the report drafted by members on their specialist subjects and the final version submitted to the group for review. This was then translated into English.

1.2 Background

China is in eastern Asia, on the west coast of the Pacific Ocean. It has a total land area of 9.6 million square kilometres. China borders the Bohai Sea, the Yellow Sea, the East China Sea and the South China Sea with a curved coast line of 18 000 kilometres and over 6 500 islands.

In the past twenty years China has witnessed a rapid expansion of fisheries production, increasing from 4.3 million tonnes in 1979 to 36.01 million tonnes in 1997. Fisheries are playing an increasing role in the country's agriculture and hence in the national economy. Its share in the value of agricultural output increased from 1.4% in 1979 to 10.6% in 1997. This is due to the reforming policies of the government of China since 1978. Fish and fishery products, as one of the major agricultural commodities, were released onto the market by the government of China in 1985 and this is believed to be the key factor in promoting the increase in China's fishery production in the past twenty years. The consumption of shark and shark products has been limited in China, even though Chinese have traditionally eaten them. This is because of the low economic importance of shark in the fishing industry as a whole plus constraints from the standard of living prevalent in China. It is only recently that these products have become more common in luxury restaurants and hotels.

1.3 Shark fishing in China

China's marine fishing fleet comprises about 280 000 motorised fishing boats and vessels, including approximately 1 000 overseas fishing vessels operating internationally. However, shark fishing has never been a significant fishery in China. According to the survey, China has about 50 fishing boats targeting sharks at present. Guangdong, Fujian, Guangxi and Hainan are the four major provinces engaged in shark fishing. The survey found that shark production comes mostly from bycatch, which accounts for about 80% of the total. Fujian is the only province recording shark production in China.

Shark Catch (tonnes) in Fujian Province

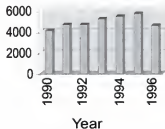


Table 1 Shark catch in Fujian province

| Year | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|----------------|-------|-------|-------|-------|-------|-------|-------|
| Catch (tonnes) | 4 160 | 4 763 | 4 756 | 5 219 | 5 499 | 5 753 | 4 608 |

Source: Statistics from Fujian Provincial Fishery Bureau

2 SHARK RESOURCES IN CHINA

There are about 110 shark species found in China's seas of which 27 are found in the Yellow and Bohai Seas, 80 in the East China Sea and 94 in the South China Sea. The shark resources of the East and South China seas appear to be relatively abundant in view of the landings and the number of important species.

Detailed records or reports on the overall situation of shark stocks in Chinese territorial waters have not been found and, due to small landings, the government of China does not list shark production in their statistics. However, experts estimate that the China's annual shark catch is between 10 and 15 000 tonnes. Large-scale shark fisheries have not been set up in China, probably because of the limited shark resources. The most common catching operations in shark fishery include longline, "brother" angling, trawling, gillnet and drift net. About 20% of the catch comes from directed shark fisheries and the remainder from bycatch. Shark fishing is equally common in the Guangdong, Fujian and Guangxi areas. Shark landings in Guangdong and Fujian provinces represent 80% of the national shark production (40% each), and the remaining 20% are from the Guangxi, Zhejiang, Hainan and Shanghai areas. According to local governmental statistics, there are about 30 important shark fishing species found in the Fujian sea area, of which 21 are caught by longline, and the landings of all these species represent 80-85% of provincial landings. The important fishing species are *Carcharhinus acronotus*, *Carcharhinus sarrakowa*, *Carcharias latistomus*, *Scoliodon sarrakowa*, *Hypoprion maculot*, *Aprionodon brevipinna*, hammerhead sharks (*Sphyrna* spp), *Cetorhinus maximus* and *Chiloscyllium plagiosum*. In 1996, 4 608 tonnes of shark were caught in Fujian province, 100 tonnes of *Chiloscyllium plagiosum*, 40 tonnes of *Carcharhinus sarrak* and 76 tonnes of *Carcharhinus melanopterus*. In Guangdong province shark catches are steady at 3-5 000 tonnes per year. 80% of provincial shark landings are obtained from longline and trawling bycatch. The major fishing operations concentrate on waters near Yangjiang, Huizhou and Shanwei cities. Yangjiang is the traditional shark fishing ground, harvesting one to 2 000 tonnes annually. The important fishing species are *Carcharhinus sarrak*, *Carcharhinus gangeticus*, *Hypoprion atripinna*, *Carcharhinus mikrophthalmus*, *Sphyrna lewini* and *Carcharodon carcharias*.

Table 2 Shark resources in China

| SPECIES | COMMON NAME | Catch recorded in: | | | | Resource assessment |
|-----------------------------------|---------------------------|-----------------------|----------------|---------------|-----------------|-----------------------|
| | | North China sea area* | East China Sea | Taiwan Strait | South China Sea | |
| HEXANCHIFORMES | | | | | | |
| Hexanchidae | | | | | | |
| <i>Hexanchus griseus</i> | Bluntnose sevengill shark | | Yes | Yes | Yes | Sighted |
| <i>Notorhynchus platycephalus</i> | Broadnose sevengill shark | Yes | Yes | Yes | Yes | Important for fishing |
| <i>Heptranchias perlo</i> | Sharpnose sevengill shark | Yes | Yes | Yes | Yes | Sighted |
| <i>Heptranchias dakini</i> | Dakin's sevengill shark | | Yes | | Yes | Unclear |
| HETERODONTIFORMES | | | | | | |
| Heterodontidae | | | | | | |
| <i>Heterodontus japonicus</i> | Japanese bullhead shark | Yes | Yes | Yes | | Sighted |
| <i>Heterodontus zebra</i> | Zebra bullhead shark | Yes | Yes | Yes | Yes | Frequently sighted |
| LAMNIFORMES | | | | | | |
| Odontaspidae | | | | | | |
| <i>Carcharias owstoni</i> | Owston's sand shark | Yes | Yes | | | Sighted |
| <i>Carcharias arenarius</i> | Sand shark | | | | Yes | Frequently sighted |

| SPECIES | COMMON NAME | Catch recorded in: | | | | Resource assessment |
|-----------------------------------|-----------------------------|-----------------------|----------------|---------------|-----------------|-----------------------|
| | | North China sea area* | East China Sea | Taiwan Strait | South China Sea | |
| Lamnidae | | | | | | |
| <i>Isurus glaucus</i> | Mackerel shark | | Yes | Yes | Yes | Frequently sighted |
| <i>Carcharodon carcharias</i> | Man-eater/great white shark | Yes | Yes | Yes | Yes | Frequently sighted |
| Cetorhinalidae | | | | | | |
| <i>Cetorhinus maximus</i> | Basking shark | Yes | Yes | Yes | Yes | Important for fishing |
| Alopiidae | | | | | | |
| <i>Alopias pelagicus</i> | Pelagic thresher shark | | Yes | Yes | Yes | Sighted |
| <i>Alopias vulpinus</i> | Thresher shark | Yes | Yes | Yes | Yes | Frequently sighted |
| ORECTOLOBIFORMES | | | | | | |
| Orectolobidae | | | | | | |
| <i>Orectolobus japonicus</i> | Japanese carpet shark | | Yes | Yes | Yes | Frequently sighted |
| <i>Orectolobus maculatus</i> | Spotted carpet shark | | Yes | Yes | Yes | Sighted |
| Stegostomatidae | | | | | | |
| <i>Stegostoma fasciatum</i> | Zebra shark | | Yes | Yes | Yes | Frequently sighted |
| Hemiscylliidae | | | | | | |
| <i>Chiloscyllium plagiocnemum</i> | Whitespotted bambooshark | | Yes | Yes | Yes | Important for fishing |
| <i>Chiloscyllium griseum</i> | Grey bambooshark | | | | Yes | Unclear |
| <i>Chiloscyllium punctatum</i> | Brownbanded bambooshark | | | Yes | Yes | Unclear |
| <i>Chiloscyllium colax</i> | Ridge back catshark | | Yes | Yes | Yes | Unclear |
| Ginglymostomatidae | | | | | | |
| <i>Ginglymostoma ferrugineum</i> | Rusty shark | | | Yes | Yes | Unclear |
| <i>Nebrius macrurus</i> | Tawny shark | | | | Yes | Unclear |
| Parascylliidae | | | | | | |
| <i>Cirrhoscyllium exipolium</i> | Barbelthroat carpetshark | | | | Yes | Unclear |
| Rhincodontidae | | | | | | |
| <i>Rhincodon typus</i> | Whale shark | Yes | Yes | Yes | Yes | Frequently sighted |
| CARCHARHINIFORMES | | | | | | |
| Scyliorhinidae | | | | | | |
| <i>Figaro melanobranchius</i> | Blackgill filetail shark | | Yes | | Yes | Sighted |
| <i>Galeus eastmani</i> | Eastman's filetail shark | | Yes | Yes | Yes | Sighted |
| <i>Galeus nipponensis</i> | Japanese filetail shark | | | | Yes | Sighted |
| <i>Galeus snateri</i> | Blacktip sawtail catshark | | Yes | Yes | Yes | Sighted |
| <i>Cephaloscyllium fasciatum</i> | Reticulated swellshark | | Yes | | Yes | Sighted |
| <i>Cephaloscyllium umbratile</i> | Marbled swellshark | Yes | Yes | Yes | Yes | Frequently sighted |
| <i>Scyliorhinus torazame</i> | Cloudy catshark | Yes | Yes | | | Sighted |
| <i>Halaeturus huergeri</i> | Blackspotted catshark | | Yes | Yes | Yes | Sighted |
| <i>Apristurus microps</i> | Small-eye catshark | | | | Yes | Unclear |
| <i>Apristurus platyrhynchus</i> | Spatulasnout catshark | | Yes | | Yes | Unclear |
| <i>Apristurus verweyi</i> | Borneo catshark | | Yes | | Yes | Unclear |
| <i>Apristurus longicephalus</i> | Longhead catshark | | Yes | | Yes | Unclear |
| <i>Apristurus sinensis</i> | South China catshark | | Yes | | Yes | Unclear |
| <i>Apristurus macrorhynchus</i> | Flathead catshark | | Yes | | Yes | Unclear |

| SPECIES | COMMON NAME | Catch recorded in: | | | | Resource assessment |
|------------------------------------|---------------------------|-----------------------|----------------|---------------|-----------------|-----------------------|
| | | North China sea area* | East China Sea | Taiwan Strait | South China Sea | |
| <i>Apristurus japonicus</i> | Japanese catshark | | Yes | | | Unclear |
| <i>Apristurus intermedius</i> | | | Yes | | | Unclear |
| <i>A. abbreviatus</i> | | | Yes | | | Unclear |
| <i>Apristurus pinguis</i> | | | | | | Unclear |
| <i>Apristurus canutus</i> | Hoary catshark | | | | Yes | Unclear |
| <i>Apristurus herklotsi</i> | Longfin catshark | | | | Yes | Unclear |
| <i>Apristurus nasutus</i> | Largenose catshark | | | | Yes | Unclear |
| <i>Atelomyxterus marmoratus</i> | Coral catshark | | Yes | Yes | Yes | Sighted |
| Proscylliidae | | | | | | |
| <i>Proscyllium hubereri</i> | Huberer's catshark | | Yes | | Yes | Sighted |
| <i>Eridacnis radcliffei</i> | Pygmy ribbontail catshark | | Yes | | Yes | Unclear |
| Triakidae | | | | | | |
| <i>Triakis venusta</i> | Spotted smooth dogfish | Yes | Yes | | Yes | Frequently sighted |
| <i>Triakis scyllium</i> | Banded houndshark | Yes | Yes | Yes | Yes | Unclear |
| <i>Galeorhinus hyogaensis</i> | Blackfin soupfin shark | | Yes | | | Unclear |
| <i>Galeorhinus japonicus</i> | Japanese soupfin shark | Yes | Yes | | Yes | Unclear |
| <i>Mustelus manazo</i> | Starspotted smooth-hound | Yes | Yes | Yes | | Important for fishing |
| <i>Mustelus griseus</i> | Spotless smooth-hound | Yes | Yes | Yes | Yes | Important for fishing |
| <i>Mustelus kamohimi</i> | Japan smooth hound | | Yes | | Yes | Sighted |
| Hemigaleidae | | | | | | |
| <i>Negogaleus micrastoma</i> | Weasel shark | | Yes | | Yes | Frequently sighted |
| <i>Negogaleus brachygnathus</i> | Shortnose shark | | | | Yes | Frequently sighted |
| <i>Negogaleus balfouri</i> | Balfour's shark | | Yes | | Yes | Frequently sighted |
| <i>Negogaleus macrostoma</i> | Bigmouth shark | | Yes | | Yes | Frequently sighted |
| <i>Paragaleus acutiventris</i> | Sharp-ventral shark | | | Yes | Yes | Sighted |
| Carcharhinidae | | | | | | |
| <i>Trienodon obesus</i> | Whitetip reef shark | | | Yes | Yes | Frequently sighted |
| <i>Galeocerdo cuvier</i> | Tiger shark | Yes | Yes | Yes | Yes | Important for fishing |
| <i>Scoliodon sorrakowah</i> | Sharp head dog shark | Yes | Yes | Yes | Yes | Important for fishing |
| <i>Scoliodon walbechii</i> | Walbech's dog shark | | Yes | Yes | Yes | Sighted |
| <i>Scoliodon palasorrah</i> | Short-fin dog shark | | Yes | | Yes | Frequently sighted |
| <i>Scoliodon dumerilii</i> | Dumeril's dog shark | | | | Yes | Sighted |
| <i>Negaprion queenslandicus</i> | Queensland lemon shark | | | | Yes | Frequently sighted |
| <i>Aprionodon brevipinna</i> | Spinner shark | | Yes | Yes | Yes | Important for fishing |
| <i>Hypoprion macdoni</i> | Macdon's shark | | Yes | Yes | Yes | Important for fishing |
| <i>Hypoprion atripinna</i> | Dusky-fin shark | | | Yes | Yes | Important for fishing |
| <i>Carcharhinus gangeticus</i> | Ganges shark | | Yes | | Yes | Important for fishing |
| <i>Carcharhinus albimarginatus</i> | Silvertip shark | | Yes | Yes | Yes | Frequently sighted |
| <i>Carcharhinus microphthalmus</i> | Small eye shark | | | | Yes | Important for fishing |

| SPECIES | COMMON NAME | Catch recorded in: | | | | Resource assessment |
|----------------------------------|------------------------|-----------------------|----------------|---------------|-----------------|-----------------------|
| | | North China sea area* | East China Sea | Taiwan Strait | South China Sea | |
| <i>Carcharhinus pleurotaenia</i> | Crossband shark | | Yes | Yes | Yes | Important for fishing |
| <i>Carcharias latistomus</i> | Bigmouth shark | Yes | Yes | | | Important for fishing |
| <i>Carcharhinus mentoanah</i> | Blackblotch shark | Yes | Yes | Yes | Yes | Important for fishing |
| <i>Carcharhinus dassumieri</i> | Whitebeck shark | | | Yes | Yes | Unclear |
| <i>Carcharhinus melanopterus</i> | Blacktip reef shark | | Yes | Yes | Yes | Important for fishing |
| <i>Carcharhinus longimanus</i> | Oceanic whitetip shark | | Yes | Yes | Yes | Frequently sighted |
| <i>Carcharhinus obscurus</i> | Dusky shark | | Yes | | | Sighted |
| <i>Carcharhinus sorrah</i> | Spottail shark | | Yes | Yes | Yes | Important for fishing |
| <i>Carcharhinus atrodorsus</i> | Blackback shark | | | | Yes | Unclear |
| <i>Carcharhinus remotoides</i> | Copper shark | | Yes | | | Unclear |
| <i>Physodon muelleri</i> | Muller's shark | | | | Yes | Sighted |
| <i>Prionace glauca</i> | Blue shark | | Yes | Yes | Yes | Important for fishing |
| Sphyrnidae | | | | | | |
| <i>Sphyrna zygaena</i> | Smooth hammerhead | Yes | Yes | Yes | Yes | Important for fishing |
| <i>Sphyrna lewini</i> | Scalloped hammer head | Yes | Yes | Yes | Yes | Important for fishing |
| <i>Sphyrna mokarran</i> | Great hammer head | | Yes | | Yes | Frequently sighted |
| <i>Sphyrna blochii</i> | Bloch's hammer head | | | | Yes | Frequently sighted |
| SQUALIFORMES | | | | | | |
| Squalidae | | | | | | |
| <i>Squalus acanthias</i> | Piked dogfish | Yes | Yes | | | Frequently sighted |
| <i>Squalus mitsukurini</i> | Shortspine spurdog | Yes | Yes | Yes | Yes | Frequently sighted |
| <i>Squalus brevirostris</i> | Shortnose dogfish | Yes | Yes | Yes | Yes | Sighted |
| <i>Scymnodon niger</i> | Velvet dogfish | | Yes | | Yes | Sighted |
| <i>Scymnodon squamulosus</i> | Velvet dogfish | | Yes | | Yes | Sighted |
| <i>Pseudocentrophorus isodon</i> | | | | | Yes | Sighted |
| <i>Deania aciculata</i> | Arrow head dogfish | | Yes | Yes | | Unclear |
| <i>Centrophorus acis</i> | Needle dogfish | | | Yes | Yes | Unclear |
| <i>Centrophorus granulosus</i> | Gulper shark | | | | Yes | Unclear |
| <i>Centrophorus squamosus</i> | Leafscale gulper shark | | Yes | | Yes | Unclear |
| <i>Centrophorus tessellatus</i> | Mosaic gulper shark | | | | Yes | Unclear |
| <i>Centrophorus robustus</i> | Gulper shark | | Yes | | | Unclear |
| <i>Centrophorus squamosus</i> | Velvet dogfish | | | | Yes | Unclear |
| <i>Centroscyllium kamoharui</i> | Barefin dogfish | | Yes | | | Unclear |
| <i>Centroscyllium fabricii</i> | Black dogfish | | | | Yes | Frequently sighted |
| <i>Centroscyllium nigrum</i> | Combtooth dogfish | | | | Yes | Unclear |

| SPECIES | COMMON NAME | Catch recorded in: | | | | Resource assessment |
|--------------------------------|----------------------|-----------------------|----------------|---------------|-----------------|---------------------|
| | | North China sea area* | East China Sea | Taiwan Strait | South China Sea | |
| <i>Centroscymnus owstoni</i> | Roughskin dogfish | | Yes | Yes | Yes | Sighted |
| <i>Etmopterus lucifer</i> | Lucifer shark | | Yes | Yes | Yes | Frequently sighted |
| <i>Etmopterus pusillus</i> | Smooth lanternshark | | | Yes | Yes | Sighted |
| SQUATINIFORMES | | | | | | |
| Squatinae | | | | | | |
| <i>Squatina japonica</i> | Japanese angel shark | Yes | Yes | Yes | | Sighted |
| <i>Squatina nebulosa</i> | Clouded angel shark | | Yes | Yes | Yes | Sighted |
| PRISTIOPHORIFORMES | | | | | | |
| Pristiophoridae | | | | | | |
| <i>Pristiophorus japonicus</i> | Japanese saw shark | Yes | Yes | | Yes | Sighted |

*North China sea area = Yellow and Bohai Sea

3 SHARK UTILIZATION IN CHINA

3.1 Catch practices

China has long history of fishing shark, which historical records date back several hundred years. Shark fishing methods vary between regions and targeted species. Fishing operations can be divided into longline, "brother" angling, set gillnet, drift net and trawling. China has the world's largest fishing fleet but very few vessels are being used for fishing shark. It is estimated that currently there are not more than 50 vessels with engine power of between 100 and 500hp equipped specially for fishing shark.

In southwest China, longline and "brother" angling are traditionally employed for fishing shark. These two operations once dominated the shark fishing industry in this region, with over 300 fishing vessels. However, only a few places retain these fishing operations and fishing vessels have been reduced to less than one sixth of this number because of the high technological inputs required for shark fishing and comparatively low profitability.

The "brother" angling method is quite complex. It does not need bait and depends on massive fishhooks attached to lines vertical to the main longline, which hook the shark swimming close to them. This operation particularly targets *Rhinobatidae* and demersal sharks and is associated with water currents. Generally speaking, if the current is mild, the line should be placed vertically to it and if it is strong the line should be placed at an angle of 60-70°. Production from brother angling is not stable but generally there are better harvests with mild currents.

Longline is relatively simple. The line usually stretches for 400meters with 20 fishhooks attached to it at intervals. Bait used includes pelagic fish and conger eel. Fishing vessels usually carry more than 100 lines and release them according to the situation on the fishing grounds and resources. Autohaulers are generally used when harvesting the sharks. This kind of operation particularly targets sharks like *C. gangeticus*, *C. microphthalmus*, *C. menisorrh*, *C. melanopterus*, *C. sorrah*, *Carcharodon carcharias* and *S. lewini*. A fishing vessel can usually harvest 20 to 50 tonnes of shark annually with this more productive fishing method. There are two categories of longline fisheries for shark in China. One specifically targets shark and 70-80% of its catch will be shark. The other is shark-cum-fish longline and shark only account for 10-20% of the catch.

The set gillnet and drift net are also used for catching sharks but they are seldom used for targeted shark fishing. Sharks are a bycatch of their operations. The species caught by these gear types are *S. lewini*, *Hypoprion macloiti*, *Carcharias latistomus*, *Carcharias pleurotaenia*, *Carcharhinus menisorrh* and *Carcharhinus sorrah*. Where shark are abundant they comprise perhaps 30% of the total catch but in waters with fewer sharks the proportion is very small.

Trawlers do not target shark but capture them as a bycatch. These are mainly *C. sorrah*, *C. menisorrh*, *Scoliodon* spp, Sphyrnidae, *Chiloscyllium* spp and occasionally big *Rhincodon typus* and *Cetorhinus maximus*. It is estimated that shark caught as a bycatch of trawling amounts to 70-80% of total shark landings.

3.2 The utilization and consumption of Chinese shark

China has a very long history of utilization and consumption of shark. In ancient China shark was used as a medicine and a nourishing food. In an ancient book named "Food Medical treatment" the nature of shark meat is described as sweet, salty and smooth and able to help the proper function of the five internal organs. Another antique treatise, "Key Points of Medica", states that shark meat can help people to alleviate swelling and stasis in their bodies and that sharkskin is sweet, salty and smooth and non-poisonous. In "Food list of Daily Life" it says that sharkskin can relieve all kinds of poison arising from fish, kill parasites and help recover from weakness. In "The addition of the Outline of Chinese Materia Medica" it says that sharkskin burnt to ashes can treat poisoning from eating fish; shark fin is sweet and can help build up one's health; shark fat is sweet, salty and smooth and is very helpful in nourishing lungs and heart and shark bile can be used to cure throat problems.

Shark meat contains a lot of proteins, unsaturated fatty acids and many kinds of minerals. In China shark meat can be cooked in different ways such as fried, soup and fish balls. Shark fin, lip and cartilage can be dried and become valuable dishes at superior banquets. Shark liver is famous as a "bank of natural A and D vitamins" and is used to extract liver oil. Sharkskin is as rough as sandpaper and is used for producing leather. Shark cartilage-derived products such as gel and chondroitin are used as anti-cancer drugs.

In the area of Fujian and Zhejiang Provinces, sharkskin soup is a famous and expensive dish. It is estimated that over half of the sharks landed in China are processed into fillets and fish balls. Most of the products are for local consumption. Shark liver contains a lot of fat and the fat contains a lot of vitamin A, vitamin D, DHA, EPA and dogfish alkene. They are all of high value and importance in medicine and promoting health. There are factories in Fujian province engaged in extracting fish liver oil and manufacturing it into drugs and health food products. Shark cartilage contains a sticky sugar (*Mucopolysaccharide*), sulphuric acid cartilage and sulphuric acid cutin, which are very important for improving health and for anti-cancer treatments.

In China the major processed products are shark fin, dried sharkskin, extruded sharkskin, shark leather, shark fillet, shark meatballs, dried shark meat floss, shark cartilage powder, shark cartilage chondroitin, shark liver oil, vitamin A and D capsules and dogfish alkene. Information on some of these products is listed in Table 3

Table 3 Price list of shark and shark products in China

| Name | Form/size | Unit | Lowest price | Highest price | Market places |
|----------------------------|--------------------|-------------------|--------------|---------------|------------------------|
| whole shark | fresh, over 30 kg | Yuan/kg | 10 | 50 | Processing plant |
| whole shark | fresh, under 30 kg | Yuan/kg | 5 | 20 | Processing plant |
| <i>Chiloscyllium colax</i> | Live, about 1kg | Yuan/kg | 20 | 50 | Hotels and restaurants |
| dried shark fin | dried, bone-off | Yuan/kg | 400 | 5000 | Hotels and restaurants |
| dried shark skin | dried, whole | Yuan/kg | 100 | 200 | Restaurants and homes |
| shark meat | frozen, fillet | Yuan/kg | 20 | 70 | Restaurants and homes |
| shark meat ball | fresh, frozen | Yuan/kg | 15 | 30 | Restaurants and homes |
| dried cartilage | dried | Yuan/kg | 30 | 200 | Pharmacies and home |
| frozen cartilage | frozen | Yuan/kg | 20 | 40 | Pharmacies |
| shark liver | fresh, salted | Yuan/kg | 0.6 | 1 | Processing plant |
| shark liver oil | barrel | Yuan/ton | 5000 | 7000 | For producing drugs |
| shark liver oil | capsule | Yuan/100 capsules | 20 | 50 | Pharmacies |
| shark cartilage powder | capsule | Yuan/100 capsules | 50 | 400 | Pharmacies |

Conversion rate: US\$1=8.28 RMB Yuan

The group visited three shark processing plants in Guangdong province. These plants are Shude Hongda Marine Products Corp. Ltd, Jiangmen Rongxing Marine Foodstuff Corp. Ltd and Zhongshan Wing Fund Shark's Fin. The processing flow is shown in Figure 1

Figure 1 Shark processing flowchart



3.3 The impact of Chinese consumption of shark on the shark resources of China

It is estimated that China produces between 10 and 15 000 tonnes of shark annually and almost all of it is consumed at home. The survey found that Chinese shark production has been quite stable for decades. There is no clear evidence of fluctuations in the shark resources of Chinese territory waters. It worth noting that China has a very small shark-targeting fleet and most of its shark production is from bycatch. With China adopting new management methods, in particular with the government setting zero growth for fishing production in 1999

in its territorial waters, bycatch of sharks will be reduced in the future. In fact the shark fishing industry appears to be shrinking because of high production costs and limitation by the fishing technology.

According to recorded data, world shark catches are around 700 000 tonnes per annum. China's catch is only a small proportion of this. Also, shark products, particularly shark fin, are very expensive. This will limit the consumption of shark products in view of the living standards in China. It is estimated that consumption of shark fin in China is only one fifteenth to one tenth of the world's shark fin consumption. Therefore, the national consumption and utilization of shark are unlikely to have a great impact on the shark resources of China or the world.

4 TRADE IN SHARK AND SHARK PRODUCTS

China has a long history of using sharks and their products but large-scale commercial exploitation of sharks, in particular significant international trade in them, is very recent. This may have been because of limited development of techniques of exploitation, utilization and harvesting and perhaps the socio-economic model adopted after the Second World War also contributed. The market economy introduced at the end of 1970s accelerated development and is highly focused on natural resources. Some traditional processing, transit, import and export activities have been stimulated. Table 12 lists the Chinese companies involved in international trade in shark produce.

The major imported shark products are shark-fins (raw material), frozen sharks (meat), fresh or chilled sharks (meat), sharkskin, shark cartilage powder or its prepared products and live sharks for exhibition in aquariums (very few). Other shark products, such as teeth and liver-oil, are believed to be imported in very small quantities. Prepared shark-fins are the major exported and/or re-exported shark products. Frozen shark and frozen shark products are also exported or re-exported. However, the survey found that there are only small numbers of factories engaged in processing sharkskins and skin derived products for re-exports and these are overseas investments or joint ventures. Although the volume of sharkskin exports is still very low, it is believed that this will rise as the requirement for the more integrated use of sharks increases at national and international levels. Up-graded management and formation of a marketing plan would promote this trend.

Table 4 Chinese imports and exports of fresh or chilled dogfish and other shark by country 1996-1998

| Year | Country | Imports | | Exports | |
|------|-----------|-----------|---------------|-----------|---------------|
| | | Kilograms | Value in US\$ | Kilograms | Value in US\$ |
| 1996 | Total | 30 208 | 251 605 | 0 | 0 |
| | Singapore | 30 208 | 251 605 | 0 | 0 |
| 1997 | Total | 214 367 | 1 359 150 | 0 | 0 |
| | Singapore | 136 351 | 942 274 | 0 | 0 |
| | Spain | 78 016 | 416 876 | 0 | 0 |
| 1998 | Total | 69 500 | 623 604 | 0 | 0 |
| | Singapore | 1 625 | 73 125 | 0 | 0 |
| | Thailand | 96 | 2 062 | 0 | 0 |
| | Spain | 67 779 | 548 417 | 0 | 0 |

Table 5 Chinese imports and exports of frozen dogfish and other sharks by country 1996-1998

| Year | Country | Imports | | Exports | |
|------|-----------|-----------|---------------|-----------|---------------|
| | | Kilograms | Value in US\$ | Kilograms | Value in US\$ |
| 1996 | Total | 454 993 | 3 124 375 | 83 854 | 4 605 569 |
| | Hong Kong | 0 | 0 | 7 672 | 103 836 |
| | Japan | 40 609 | 56 223 | 76 182 | 4 501 733 |
| | Singapore | 25 120 | 359 015 | 0 | 0 |
| | Spain | 389 264 | 2 709 137 | 0 | 0 |
| 1997 | Total | 362 924 | 352 844 | 13 485 | 588 941 |
| | Korea | 150 | 180 | 0 | 0 |
| | Japan | 362 774 | 352 664 | 13 485 | 588 941 |

| Year | Country | Imports | | Exports | |
|------|--------------|----------------|------------------|---------------|------------------|
| | | Kilograms | Value in US\$ | Kilograms | Value in US\$ |
| 1998 | Total | 243 490 | 1 757 437 | 41 505 | 2 273 172 |
| | Japan | 143 887 | 1 169 031 | 41 505 | 2 273 172 |
| | Singapore | 284 | 85 | 0 | 0 |
| | Spain | 92 946 | 578 033 | 0 | 0 |
| | Norway | 6 373 | 10 288 | 0 | 0 |

Table 6 Chinese imports and exports of dried shark fin by country 1996-1998

Chinese customs does not have a code for frozen raw shark fins so these are included here

| Year | Country | Imports | | Exports | |
|------------|-------------------|------------------|-------------------|------------------|-------------------|
| | | Kilograms | Value in US\$ | Kilograms | Value in US\$ |
| 1996 | Total | 4 362 543 | 24 485 694 | 2 191 750 | 22 443 703 |
| | Cambodia | 0 | 0 | 600 | 930 |
| | Hong Kong | 124 670 | 818 981 | 2 053 464 | 20 309 609 |
| | Indonesia | 69 361 | 338 061 | 0 | 0 |
| | Japan | 3 101 070 | 18 642 915 | 120 437 | 1 310 868 |
| | Macau | 0 | 0 | 2 909 | 34 313 |
| | Malaysia | 25 849 | 86 561 | 8 | 2 700 |
| | Philippines | 7 923 | 208 015 | 0 | 0 |
| | Singapore | 348 485 | 1 526 450 | 13 642 | 725 962 |
| | Korea Rep. | 6 379 | 8 248 | 600 | 54 521 |
| | Thailand | 28 715 | 91 800 | 0 | 0 |
| | Vietnam | 44 783 | 475 987 | 0 | 0 |
| | Taiwan POC | 60 422 | 203 957 | 0 | 0 |
| | Guinea | 2 163 | 2 795 | 0 | 0 |
| | South Africa | 91 672 | 329 679 | 0 | 0 |
| | Spain | 424 051 | 1 608 828 | 0 | 0 |
| | Brazil | 780 | 1 009 | 0 | 0 |
| | Costa Rica | 6 885 | 39 729 | 0 | 0 |
| | Panama | 437 | 4 812 | 0 | 0 |
| | United States | 17 237 | 87 090 | 90 | 4 800 |
| Others | 1 661 | 10 777 | 0 | 0 | |
| 1997 | Total | 4 388 801 | 24 794 029 | 2 420 488 | 32 654 143 |
| | Hong Kong | 58 864 | 835 695 | 2 242 181 | 29 077 238 |
| | Indonesia | 60 135 | 258 666 | 0 | 0 |
| | Japan | 2 829 415 | 17 737 641 | 147 904 | 2 812 114 |
| | Macau | 1 972 | 20 371 | 3 081 | 61 515 |
| | Malaysia | 0 | 0 | 11 056 | 80 676 |
| | Philippines | 6 553 | 169 242 | 12 | 30 |
| | Singapore | 389 339 | 1 493 785 | 12 897 | 567 236 |
| | Republic of Korea | 0 | 0 | 800 | 6 619 |
| | Thailand | 6 656 | 30 315 | 0 | 0 |
| | U Arab Emirates | 5 329 | 27 548 | 0 | 0 |
| | Vietnam | 48 707 | 503 367 | 0 | 0 |
| | Taiwan POC | 41 592 | 154 887 | 205 | 2 329 |
| | Kenya | 555 | 4 916 | 0 | 0 |
| | South Africa | 17 400 | 112 793 | 0 | 0 |
| | UK | 11 604 | 47 666 | 0 | 0 |
| | France | 0 | 0 | 133 | 10 421 |
| | Spain | 833 938 | 3 173 081 | 376 | 7 395 |
| | Iceland | 95 | 127 | 0 | 0 |
| | Brazil | 1 736 | 2 243 | 0 | 0 |
| Costa Rica | 12 072 | 54 571 | 0 | 0 | |

| Year | Country | Imports | | Exports | |
|-----------------|---------------|------------------|-------------------|------------------|-------------------|
| | | Kilograms | Value in US\$ | Kilograms | Value in US\$ |
| 1997 (cont.) | Ecuador | 10 000 | 2 006 | 0 | 0 |
| | Panama | 160 | 1 760 | 0 | 0 |
| | Uruguay | 9 374 | 1 881 | 0 | 0 |
| | United States | 1 332 | 7 465 | 1 843 | 28 570 |
| | Australia | 2 267 | 10 249 | 0 | 0 |
| | Others | 39 706 | 143 754 | 0 | 0 |
| 1998 | Total | 4 236 377 | 24 749 924 | 2 005 481 | 31 742 017 |
| | Burma | 120 | 578 | 0 | 0 |
| | Hong Kong | 46 435 | 246 196 | 1 930 412 | 30 550 920 |
| | Indonesia | 67 905 | 288 500 | 0 | 0 |
| | Japan | 2 697 768 | 18 603 993 | 51 001 | 697 223 |
| | Macau | 0 | 0 | 922 | 19 862 |
| | Philippines | 2 010 | 51 894 | 0 | 0 |
| | Singapore | 297 068 | 1 275 919 | 21 942 | 431 281 |
| | Thailand | 9 | 221 | 0 | 0 |
| | Vietnam | 24 681 | 237 716 | 0 | 0 |
| | Madagascar | 428 | 17 120 | 0 | 0 |
| | France | 0 | 0 | 238 | 20 888 |
| | Spain | 1 041 627 | 3 850 246 | 323 | 10 336 |
| | Norway | 24 047 | 77 572 | 0 | 0 |
| | Brazil | 1 282 | 11 541 | 0 | 0 |
| | Costa Rica | 18 980 | 33 930 | 0 | 0 |
| | Ecuador | 6 488 | 976 | 0 | 0 |
| | Peru | 3 437 | 15 531 | 0 | 0 |
| | United States | 1 906 | 22 344 | 629 | 10 852 |
| | Australia | 8 | 35 | 14 | 655 |
| Fiji | 2 178 | 15 612 | 0 | 0 | |

The figures in Table 4, Table 5 and Table 6 only give a generalised picture of China's trade in shark products. The Customs Service of the People's Republic of China has adopted the Harmonised System (HS) code for trade monitoring, controlling and record-keeping. Among thousands of codes there are only three specifically used for sharks and their products:

- 03026500 - Dogfish and other shark, fresh or chilled. (These are fresh if the value of the ninth digit is 1 and chilled if it is 9.)
- 03037500 - Dogfish and other sharks, frozen
- 03055920 - Dried shark fins

Table 7 Tariffs levied on shark products in China 1996-1999

| Year | HS code | Reciprocal tariff (%) | General tariff (%) | Added tariff (VAT)(%) |
|-----------|------------|-----------------------|--------------------|-----------------------|
| 1996-1997 | 03026500 1 | 30 | 40 | 13 |
| | 03026500 9 | 30 | 40 | 17 |
| | 03037500 | 30 | 40 | 17 |
| | 03055920 | 55 | 80 | 17 |
| 1997-1998 | 03026500 1 | 30 | 40 | 13 |
| | 03026500.9 | 30 | 40 | 17 |
| | 03037500 | 30 | 40 | 17 |
| | 03055920 | 55 | 80 | 17 |
| 1998-1999 | 03026500 1 | 15 | 40 | 13 |
| | 03026500.9 | 15 | 40 | 17 |
| | 03037500 | 15 | 40 | 17 |
| | 03055920 | 30 | 80 | 17 |

Other shark-related products are included in the following codes, which are not specifically used for sharks:

- 01060029 - Other edible live animals
- 01060090 - Other live animals
- 41039090 - Other raw leather
- 41079000 - Other animal's leather

Even the three codes that are specifically used for shark products are not itemised by species. In 1998 the Chinese government managed records of the import and export of all sharks and their products according to the relevant CITES decisions and recommendations¹. The Shark Management Authority gave us some data for 1998 related to specific shark species. Due to lack of experience and problems with species identification this can only be used for reference, so that we can make a cursory review of shark species traded. See Table 8 and Table 9.

Table 8 Commonly Imported shark species

| Scientific Name | English Name | Product | Country of origin | Imported from | Location of company |
|--------------------------|----------------------|-----------|-------------------|-----------------|---------------------|
| <i>Sphyrna lewini</i> | Scalloped hammerhead | Shark fin | Spain | | Fujian |
| <i>Prionace glauca</i> | Blue shark | Sharkskin | | Japan | Fujian |
| <i>Prionace glauca</i> | Blue shark | Sharkskin | | Hong Kong | Fujian |
| <i>Squalus acanthias</i> | Spiny dogfish | Shark fin | | Japan | Shandong |
| <i>Prionace glauca</i> | Blue shark | Shark fin | Indonesia, Peru | Indonesia, Peru | Guangdong |
| <i>Carcharhinidae</i> | Requiem sharks | Shark fin | Japan | Japan | Shandong |
| <i>Carcharhinidae</i> | Requiem sharks | Shark fin | Singapore | Singapore | Shandong |
| <i>Carcharhinidae</i> | Requiem sharks | Shark fin | Spain | Spain | Shandong |

Table 9 Commonly (re)exported shark species

| Scientific Name | English Name | Product | Country of Origin | Re-exported to | Location of company |
|--------------------------|----------------------|-----------|-------------------|----------------|---------------------|
| <i>Sphyrna lewini</i> | Scalloped hammerhead | Shark fin | Spain | | Fujian |
| <i>Prionace glauca</i> | Blue shark | Shark fin | Indonesia, Peru | | Guangdong |
| <i>Prionace glauca</i> | Blue shark | Shark fin | | Japan | Beijing |
| <i>Isurus paucus</i> | Shortfin mako | Shark fin | | Japan | Beijing |
| <i>Squalus acanthias</i> | Spiny dogfish | Shark fin | | Japan | Shandong |
| <i>Squalus acanthias</i> | Spiny dogfish | Shark fin | | Hong Kong | Shandong |
| <i>Carcharhinidae</i> | Requiem sharks | Shark fin | Spain | Spain | Shandong |
| <i>Carcharhinidae</i> | Requiem sharks | Shark fin | Japan | Japan | Shandong |
| <i>Carcharhinidae</i> | Requiem sharks | Shark fin | Japan | Spain | Shandong |
| <i>Carcharhinidae</i> | Requiem sharks | Shark fin | Singapore | Singapore | Shandong |
| <i>Carcharhinidae</i> | Requiem sharks | Shark fin | Singapore | Spain | Shandong |

According to data collected by the Shark Management Authorities in 1998, almost all shark products are imported; only a small proportion being account for by local sharks. The countries of origin include Spain, some coastal countries in Southern Africa, Indonesia, Singapore, Japan and Hong Kong, special administrative region of China. The destinations of re-exports include Japan, Spain, Singapore and Hong Kong. As significant difficulties arose in the collection of this data, with problems of management, statistical methods and check-back mechanisms, its accuracy cannot be guaranteed. To avoid misleading, we have contacted some traders directly to verify or correct certain points and hope to reflect the actual situation as closely as possible.

¹ CITES Decision 10.48 - Regarding the biological and trade status of sharks (To Parties)

CITES Decision 10.73/74 - Regarding the biological and trade status of sharks (To Animal Committee)

CITES Decision 10.93 - Regarding the biological and trade status of sharks (To FAO)

CITES Decision 10.126 - Regarding the biological and trade status of sharks (To Secretariat)

It is impossible for us to give species-related trading data for all shark products because of these limitations but the data related to code 03055920 - Dried shark fin - can be used as an indicator to review shark trading. The total volume of shark fins imported in 1997 and 1998 were 4 388 801kg and 4 236 377kg respectively. The exports for these two years were 2 420 488kg and 2 005 481kg, so both imports and exports of dried shark fin fell. This may have been caused by the ongoing Asian economic crisis. In view of the difference in volume between imports and exports of shark fins in 1997 and 1998 and the weight loss which arises when shark fins are processed from raw materials to prepared products, we may conclude that the volume of imported shark fins for internal consumption is not significant. Domestic shark production that may be exported as shark fin products is also insignificant.

Twenty-seven Chinese aquariums were approached regarding imports of live sharks. It was found that only a small number of shark species and individuals have been imported for exhibition in Chinese aquariums. Specific data is provided in Table 10 and Table 11 for reference.

Table 10 Exhibition sharks available in Chinese aquariums

| Name of Aquarium | Telephone Number | Sharks Imported |
|--|-------------------|-------------------|
| Aquarium, Nine-dragon Amusement Park, Beijing | 010-60713399 | Yes, not specific |
| Aquatic Products Museum, Beijing Agricultural Exhibition Hall | 010-65024428 | No |
| Beijing Worker Palaestra Fuguo Sea-world, Beijing | 010-65913397 | Yes, not specific |
| Hydrophilic Creatures Exhibition, Beijing Nature Museum, Beijing | 010-67024431-3076 | Yes |
| Beijing Pacific Sea-world, Beijing | 010-68461173 | Yes |
| Guangzhou Oceanic Museum, Guangdong | 020-87611884 | Yes |
| Nanjing Sea-world, Jiangsu | 025-4441119- | Yes, not specific |
| New World Aquatic Animal Park, Wuhan, Hubei | 027-85877339 | No |
| White-fin Dolphin Exhibition Hall, Wuhan Hydrophilic Creatures Research Institute of the Chinese Academy of Sciences | 027-87800371 | No |
| Xian Aquatic Animals Palace, Shaanxi | 029-2223510 | Yes, not specific |
| Beidaihe Rare and Precious Aquatic Animal Hall, Hebei | 0335-4041230 | Shut down |
| Shanhaiguan Oceanic Aquatic Animal Museum, Hebei | 0335-5052000 | Yes, not specific |
| Xingao Sea-world of Qinghuangdao, Hebei | 0335-8065699 | Yes |
| Dalian Blue-Sea Hilly Village Aquarium, Liaoning | 0411-7600266-- | not connected |
| Underwater World of Tiger-beech Paradise, Dalian, Liaoning | 0411-2684217 | Yes, not specific |
| Sun-Asia Ocean World, Dalian, Liaoning | 0411-4685216 | Yes |
| Yunlong Lake Aquatic World, Xuzhou, Jiangsu | 0516-5715624 | Not connected |
| Orential Aquatic Animals World, Wuxi, Jiangsu | 0518-5801424 | No |
| Lingyan Temple Aquatic Insects Museum, Changqing, Shandong | 0531-7463169 | Not connected |
| Aquatic Animal Building of Oceanic Institute of the Chinese Academy of Sciences, Qingdao, Shandong | - | No |
| Qingdao Ocean Product Museum, Shandong | 0532-2864949 | Yes |
| Yangmadao Ocean World, Yantai, Shandong | - | not connected |
| Zuohai Aquarium, Fujian | 0591-7850178 | Yes |
| Xiamen Sea-world, Fujian | 0592-2067825 | Yes |
| Beihai Aquatic Products Museum, Guangxi | 0779-2062089 | Yes |
| Kungming Aquarium | 0871-5145684 | not connected |
| Skyline Tropical Ocean Zoo, Sanya, Hainan | 0899-8910128 | not connected |

Table 11 The origin of exhibition sharks in Chinese aquariums

| Scientific Name | English Name | Number of sharks | Source |
|----------------------------------|------------------------|------------------|--|
| <i>Carcharhinus melanopterus</i> | Blackfin shark | 15 | South China Sea |
| <i>Chiloscyllium plagiosum</i> | White-spotted catshark | 19 | North China sea area, South China Sea, 5 imported from Hong Kong |
| <i>Chiloscyllium griseum</i> | Blackband cat shark | 9 | South China Sea |
| <i>Ginglymostoma cirratum</i> | Nurse shark | 20 | South China Sea |
| <i>Ginglymostoma ferrugineum</i> | Rusty Shark | 6 | South China Sea, 3 imported from United States |
| <i>Nebrius macrurus</i> | Large tail shark | 5 | South China Sea |
| <i>Negaprion queenslandicus</i> | Queensland Lemon Shark | 3 | Imported from HK SAR |
| <i>Orectolobus japonicus</i> | Japanese carpet shark | 8 | South China Sea |
| <i>Stegostoma fasciatum</i> | Zebra Shark | 10 | South China Sea, 2 imported from Hong Kong |
| <i>Triacodon obesus</i> | Blunthead shark | 7 | South China Sea |
| <i>Triakis seyllium</i> | Banded gummy shark | 167 | North China sea area |
| <i>Triakis venusta</i> | Spotted smooth dogfish | 7 | North China sea area |
| Total | | 276 | |

The conclusion is that few live sharks are used for exhibition or public education programmes in Chinese aquariums. Although some aquariums have not been contacted and the above figure may not be exact, we believe that this does reflect the current situation of trade in live sharks.

5 SHARK FISHERY MANAGEMENT AND REGULATION IN CHINA

5.1 Management Authorities

As stipulated in "Fisheries Law of the People's Republic of China" and "Law of Wild Animal Protection of the People's Republic of China", the highest unit responsible for shark management in China is the Bureau of Fisheries Management and Fishing Port Superintendence (Bureau of Fisheries), Ministry of Agriculture. The Bureau is responsible for the overall management of shark fishing, resource conservation and shark product imports and exports within national jurisdiction. Meanwhile, management authorities at local level such as county, city and province (autonomous regions and municipalities directly under the central government) have been set up for the management of shark resources.

5.2 Laws and Regulations

Fisheries Law of the People's Republic of China, put into force on 20 January 1986, is the highest national law governing fisheries management in China. It stipulates that:

- The Department of Fishery Administration under the State Council shall be in charge of the administration of fisheries throughout the country. Departments of Fisheries Administration under People's Governments at or above the county level shall be in charge of fisheries in their respective areas.
- All productive activities of fisheries such as aquaculture and fishing or harvesting of aquatic animals and plants in the inland waters, tidal flats and territorial waters of the People's Republic of China or in other sea areas under the jurisdiction of the People's Republic of China must be conducted in accordance with this Law.
- Any unit or individual that intends to engage in inland water or inshore and offshore fishing must first apply to the fisheries administration authorities for fishing licences.

Permits from fishery management authorities have to be obtained in order to exploit shark resources, as for all other fish. Shark fishing licences have been well issued, particularly in the provinces of Guangdong, Fujian, Zhejiang, Hainan and Guangxi, where shark fishing is traditional.

Law of Wild Animals Protection of the People's Republic of China was put in force on 8 November 1988. It provides:

- The state forest and fisheries administrations are responsible for the management of land animals and aquatic animals.
- The state carries out the policy of enhancing resources conservation, actively domesticating, propagating and reasonably utilizing fish stocks. The state encourages scientific research concerning wild animals.

Other laws and regulations related to shark fishery management are:

- Regulations on Fisheries Resources Propagation and Conservation of the People's Republic of China
- Regulations for the Implementation of the Fisheries Law of the People's Republic of China
- Law of Environment Protection of the People's Republic of China
- Law of Marine Environment Protection of the People's Republic of China

In its efforts to protect and conserve its fishery resources, the government of China has adopted a series of measures to limit fishing in its territorial waters. The most important actions are:

1. Limiting the growth in the number of fishing boats and vessels since 1996, through the re-issuing of fishing licences.
2. Establishment of conservation zones.
3. Controlling net mesh sizes.
4. Imposing fishing bans in its territorial waters every year since 1995.
5. Setting a zero growth rate for fishing production in its territorial waters in 1999.

The aim of these actions is to restore and maintain fishery resources, including shark stocks.

The Bureau of Fisheries has enhanced its control over the import and export of shark products. During the Tenth International Trade Conference of the endangered species of wild fauna and flora in 1997, the Chinese delegation favoured the proposal on shark stocks protection put forward by the United States and IUCN. In December 1997 the Government of China issued a circular which contains "The commodity list of the species of imports and exports of wild fauna and flora" (Number 48 [1997] Bin Ban Zhong Zi). Fresh, chilled and frozen dogfish and other sharks and shark fin are included on the list. Since 1 January 1998 all imports, exports and re-export of shark and shark products must first be approved by the Bureau of Fisheries, Ministry of Agriculture. The Bureau of Fisheries is expected to begin an investigation of shark resources and determine the protection grade required for these resources based on their findings. The Wildlife Protection Law will bring some threatened shark species, such as Cetorhinidae and Rhincoodontidae, into the protected category.

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7 CHINESE COMPANIES INVOLVED IN INTERNATIONAL TRADE IN SHARK PRODUCTS

China is still developing under special economic conditions, which make the administration of enterprise and international trade different from elsewhere. Factories and plants engaged in processing sharks are limited by labour force, environmental requirements and other relevant factors. Most originated in Hong Kong or other Southeast Asian countries. Except for four or five of them, they are small factories or workshops. They lack knowledge about species identification and most of them are not allowed to deal directly with imports and exports, as they do not have permission to engage international trade. All international trade has to be dealt with by professional agents who have the right to import and export. The names of companies that were engaged in imports and exports of sharks or their products in 1997 and 1998, according to Chinese Customs data, are the only ones available. These may not correspond with enterprises that are involved in shark processing.

Table 12 Chinese companies importing and exporting shark products

| Company Code | Company Name | Imports | | | | Exports | | | |
|--|--|----------------|----------------|------------------|------------------|---------------|---------------|----------------|------------------|
| | | Kilograms | | Value in US\$ | | Kilograms | | Value in US\$ | |
| | | 1997 | 1998 | 1997 | 1998 | 1997 | 1998 | 1997 | 1998 |
| Dogfish and other sharks, fresh or chilled (Customs code 03026500) | | | | | | | | | |
| 3111930489 | Shanghai Yifeng Foodstuff Corp. Ltd | p | p | p | p | | | | |
| Sub-total | | 214 367 | 69 500 | 1 359 150 | 623 604 | 0 | 0 | 0 | 0 |
| Dogfish and other sharks, frozen (Customs code 03037500) | | | | | | | | | |
| 2102912013 | Foodstuff Import & Export Company of Liaoning Province | p | p | p | p | p | p | p | p |
| 2102930383 | Has been cancelled | p | p | | | | | | |
| 2207910020 | Hunchun Company of Yambian Foreign Economy and Technology Co-operation Company | p | | p | | | | | |
| 3101915076 | Shanghai General Aquatic Products (Group) Company | | p | | p | | | | |
| 3301931587 | Zhejiang Ocean Frozen Products Corp. Ltd. | | p | | p | | | | |
| 4406910061 | Foshan Material Group | | p | | p | | | | |
| 4428910004 | Nanhai Foreign Trade Developing Company | | p | | p | | | | |
| Sub-total | | 362 924 | 243 490 | 352 844 | 1 757 437 | 13 485 | 41 505 | 588 941 | 2 273 172 |
| Dried shark fins (Customs code 03055920 - Chinese Customs does not have a code for frozen raw shark fins so these are include here) | | | | | | | | | |
| 1102919041 | China National General Company of Aquatic Products | p | p | p | p | p | p | p | p |
| 1105919123 | China Ocean International Trade Company | | p | | p | | | | |
| 1105930939 | Beijing Myriad Twinkling Lights Restaurant Corp. Ltd. | p | p | p | p | | | | |
| 1105999000 | Miscellaneous Company | | p | | p | | | | |
| 1108919002 | Diaoyutai State Guest Hotel Administration Bureau of the Ministry of Foreign Affairs | | p | | p | | | | |
| 1110930072 | Huatang Gasiquo Foodstuff Corp. Ltd. | p | p | p | p | p | p | p | p |
| 1111930046 | Beijing Aviation Foodstuff Corp. Ltd. | p | p | p | p | | | | |
| 1301915024 | Hebei Provincial Import and Export Trading Company | | p | | p | | | | |
| 2102912003 | Liaoning Provincial General Foreign Trade Company | | p | | p | | | | |
| | | | p | | p | | | | |
| 2102912013 | | | p | | p | | | | |
| 2102930370 | Dalian Yanshan Foodstuff Corp. Ltd. | | p | | p | | | | |
| 2102950007 | Dalian Bo-Sea General Import and Export Company | | p | | p | | | | |
| 3106915038 | Shanghai Meilongzhen (Group) Corp. Ltd. | | p | | p | | | | |
| 3106915014 | Shanghai United Trading Company | | p | | p | | | | |
| 3303910020 | Wenzhou Import and Export Company | | p | | p | | | | |
| 3501910232 | Fujian Tea Import and Export Company under China Native Produce Company | | p | | p | | | | |

| Company Code | Company Name | Imports | | | | Exports | | | |
|--------------|---|-----------|------|---------------|------|-----------|------|---------------|------|
| | | Kilograms | | Value in US\$ | | Kilograms | | Value in US\$ | |
| | | 1997 | 1998 | 1997 | 1998 | 1997 | 1998 | 1997 | 1998 |
| 3501912707 | Fujian Provincial Grain and Oil Import & Export Company | | | | | | | | |
| 3502110230 | Xiamen Industry Foreign Economy and Trade Developing Company | | | | | p | | | p |
| 35080945332 | Ningde Zhongxin Seafood Corp. Ltd. | p | p | p | p | | | | |
| 3701932352 | Qilu Hotel Corp. Ltd. | | | | | p | | | p |
| 3702240214 | Qingdao Tianshihaha Foodstuff Corp. Ltd. | | | | | p | | | p |
| 3706931767 | Changhua Aquatic Products Breeding Corp. Ltd of Changdao | | | | | | | p | p |
| 3706940604 | Longhua Aquatic Products Corp. Ltd. of Yantai | | | | | | | p | p |
| 4401913151 | Guangzhou Foreign Trade Baiyun Company | p | p | p | p | | | | |
| 4401913168 | Guangzhou Yaxu Enterprise (Group) Company | | | | | p | | | p |
| 4401913315 | Guangzhou Foreign Economy Developing Liwan Company | p | p | p | p | | | | |
| 4401913450 | Guangzhou Liwan Foreign Trading Company | | | | | p | | | p |
| 4401923205 | Guangzhou Dongxing Oceanic Aquatic Products Foodstuff Company | | | | | | | p | p |
| 4403110609 | Shenzhen Weishida Industry & Trade Developing Company | | | | | | | | |
| 4403142426 | Dimen Foodstuff (Shenzhen) Corp. Ltd. | | | | | | | p | p |
| 4403910498 | Shenzhen Baoun General Foreign Economy Developing Company | p | p | p | p | | | | |
| 4403941264 | Weique Huangting Golden Fin Marine Product (Shenzhen) Corp. Ltd. | | | | | | | p | p |
| 4404110054 | General Grocery Company of Zhuhai Special Economical Zone | | | | | | | p | p |
| 4404110351 | Zhuhai Light-industry Arts Import and Export Company | | | | | p | | | |
| 4404150191 | Zhuhai Economy and Trade Group Company | p | p | p | p | | | | |
| 4405110139 | Shantelishan Economy Developing Company | | | | | p | | | p |
| 4405911036 | Chaoyang Quofeng (Group) Corp. Ltd. | | | | | | | p | p |
| 44060917007 | Shanshui Branch Company of Guangdong Foreign Economy Developing Company | p | p | p | p | | | | |
| 44060917008 | Shanshui County Grain, Oil and Foodstuff Import and Export Company | | | | | p | | | p |
| 4407910007 | Guangdong Jiangmen Foreign Economy and Trade Import and Export Company | | | | | | | p | p |
| 4407910049 | Jiangmen Foreign Processing & Fitting Service Company | p | p | p | p | | | | |

| Company Code | Company Name | Imports | | | | Exports | | | | | | | |
|--------------|---|-----------|------|---------------|------|-----------|------|---------------|------|--|--|--|--|
| | | Kilograms | | Value in US\$ | | Kilograms | | Value in US\$ | | | | | |
| | | 1997 | 1998 | 1997 | 1998 | 1997 | 1998 | 1997 | 1998 | | | | |
| 4407910040 | Jiangmen Hongda (Group) Corp. Ltd. | | | | | | | | | | | | |
| 4407912001 | Xinhui Branch Company of Xinhui Foodstuff Import and Export Company | | | | | | | | | | | | |
| 4407912007 | Xinhui Grain and Oil Import and Export Company | | | | | | | | | | | | |
| 4407912009 | Xinhui Foreign Economy Developing Company | | | | | | | | | | | | |
| 4407912014 | Xinhui Foreign Processing and Fitting Service Company | | | | | | | | | | | | |
| 4407914006 | Kaiping Foreign Processing and Fitting Service Company | | | | | | | | | | | | |
| 4407918004 | Guangdong Taishan Foodstuff Import and Export Company | | | | | | | | | | | | |
| 4407918009 | Guangdong Taishan Foreign Processing and Fitting Service Company | | | | | | | | | | | | |
| 4407920206 | Jiangmen Huasheng Marine Product Corp. Ltd. | | | | | | | | | | | | |
| 4407920313 | Jiangmen Dongjiao Shark-fin-marine Product Developing Corp. Ltd. | | | | | | | | | | | | |
| 4407930128 | Jiangmen Rongxing Marine Foodstuff Plant Corp. Ltd. | | | | | | | | | | | | |
| 4407930233 | Jiangmen Zhonghong Marine Foodstuff Corp. Ltd. | | | | | | | | | | | | |
| 4407940069 | Jiangmen Hanchanglong Sharkfin Corp. Ltd. | | | | | | | | | | | | |
| 4407942038 | Xinhui Demu Marine Foodstuff Corp. Ltd. | | | | | | | | | | | | |
| 4407949020 | Enping Sky and Sea Foodstuff Corp. Ltd. | | | | | | | | | | | | |
| 4407952001 | Xinhui Tangxia Foreign Processing & Fitting Service Company | | | | | | | | | | | | |
| 4409932071 | Dianhai Yongzhong Murrine Product Corp. Ltd. | | | | | | | | | | | | |
| 4412928557 | Xinxing Ganglin Seafood Products Corp. Ltd. | | | | | | | | | | | | |
| 4419910022 | Dongguan Foreign Processing and Fitting Service Company | | | | | | | | | | | | |
| 4419910041 | Dongguan General Commerce Company | | | | | | | | | | | | |
| 4419921110 | Lieheng Foodstuff (Dongguan) Corp. Ltd. | | | | | | | | | | | | |
| 4420910007 | Guangdong Zhongshan Foodstuff and Aquatic Product Import and Export Group Company | | | | | | | | | | | | |
| 4420910018 | Zhongshan Aquatic Product Import and Export Company | | | | | | | | | | | | |
| 4420950002 | Zhongshan Sanxiang Foreign Processing and Fitting Service Company | | | | | | | | | | | | |
| 4420950009 | Zhongshan Foreign Processing and Fitting Service Company | | | | | | | | | | | | |
| 4420950015 | Doufang Foreign Processing and Fitting Service Company | | | | | | | | | | | | |
| 4422910005 | Shunde Branch Company of Guangdong Foreign Trading Developing Company | | | | | | | | | | | | |

| Company Code | Company Name | Imports | | | | Exports | | | |
|------------------|---|------------------|------------------|-------------------|-------------------|------------------|------------------|-------------------|-------------------|
| | | Kilograms | | Value in US\$ | | Kilograms | | Value in US\$ | |
| | | 1997 | 1998 | 1997 | 1998 | 1997 | 1998 | 1997 | 1998 |
| 4422910006 | Shunde Foodstuff Import and Export Company | p | p | p | p | p | p | p | p |
| 4422910008 | Shunde Metal and Mine Import and Export Company | | | | | | | | |
| 4422910012 | Shunde Textile Import and Export Company | p | p | p | p | p | p | p | p |
| 4422930202 | Shunde Xishun Foodstuff Company | p | p | p | p | p | p | p | p |
| 4422930757 | Shunde Hongda Marine Product Corp. Ltd. | p | p | p | p | p | p | p | p |
| 4422930949 | Shunde Jianjun Aquatic Products Corp. Ltd. | p | p | p | p | p | p | p | p |
| 4422950022 | Shunde Ports Group Company | p | p | p | p | p | p | p | p |
| 4428910004 | Nanhai Foreign Trading Developing Company | p | p | p | p | p | p | p | p |
| 4428910007 | Nanhai Arts Import and Export Company | | | | | | | | |
| 5101990715 | Has been cancelled | p | | p | | | | | |
| 5319951046 | Yingjiang Zhenbong General Trading Industry Company | | | | | | | | |
| Sub-total | | 4 388 801 | 4 236 377 | 24 794 029 | 24 749 924 | 2 420 488 | 2 005 481 | 32 654 143 | 31 742 017 |



Photograph 1 Sharks caught in the Chinese Sea



Photograph 2 Imported frozen shark fins



Photograph 3 Shark fin workshop



Photograph 4 Shark fin products in Guangzhen market



Photograph 5 Shark skin for sale

APPENDIX IV.5

SHARKS AND RAYS IN LATIN AMERICA

by J. SANTIAGO CARO ROS

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1 INTRODUCTION

This paper focuses on research into catches, industrial usage and trade in shark and skate, which are classified as cartilaginous species. Landings throughout the world are showing a worrying situation for this group. This has made a number of international organisations, governments, non-governmental organisations and scientists in general pay special attention to a phenomenon that appears to become worse every year.

The presence of sharks as a bycatch of other fishing exploitation such as tuna long lining and purse seine fisheries, as well as trawling and long line fisheries for groundfish, is one reason that could explain the decrease of these stocks.

Sharks are used as a raw material for commercial products over a wide range of prices. Shark meat is the product of most generic consumption. It is traded in domestic and export markets in chilled, frozen or dried-salted form. Shark liver has been used mostly as a raw material for the production of pharmaceutical products. Shark fins are one of the most quoted products, mainly in the Far East markets. More recently the cartilage has become the object of some industrial interest, since some curative properties have been attributed to it.

Thus, either as a bycatch or as target resource itself, there are many reasons for shark schools to present serious signs of risk. In addition, many species need a long time to reach their reproductive age and, unlike other commercial fishing resources, shark species have only recently been object of the benefit of specific protection measures.

Table 1 Annual world catches of sharks and rays (in tonnes)

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|-----------------|---------|---------|---------|---------|---------|
| World Total | 706 183 | 725 314 | 737 053 | 749 592 | 754 864 |
| % Latin America | 11.1% | 12.7% | 12.6% | 12.2% | 12.7% |

Source: *FAO Yearbook*

The figures show a slightly increasing trend from 1991. However, it is important to specify that these figures correspond to official landings. This point is particularly relevant taking into account that, as a bycatch, shark is often returned to the sea either already dead or seriously crippled. The discard figures do not appear in any official register. According to official figures from FAO, the Latin American countries contributed between 11% and 13% to world catches of sharks and rays during the period 1991-1995.

Table 2 Annual catches of sharks and rays by Latin American and Caribbean countries (tonnes)

| Country | 1991 | 1992 | 1993 | 1994 | 1995 |
|-------------------|--------|--------|--------|--------|--------|
| Mexico | 33 998 | 36 121 | 37 305 | 36 125 | 36 398 |
| Argentina | 13 582 | 14 903 | 16 659 | 21 869 | 22 970 |
| Peru | 5 586 | 13 571 | 13 908 | 5 926 | 7 070 |
| Venezuela | 6 811 | 7 970 | 7 849 | 8 650 | 9 918 |
| Brazil | 6 021 | 5 920 | 5 900 | 5 910 | 6 110 |
| Chile | 6 738 | 6 226 | 5 703 | 5 556 | 4 249 |
| Costa Rica | 1 519 | 1 809 | 1 823 | 2 486 | 2 601 |
| Uruguay | 1 160 | 1 198 | 1 260 | 2 300 | 3 332 |
| Cuba | 1 328 | 1 314 | 893 | 1 383 | 1 365 |
| Trinidad & Tobago | 922 | 531 | 440 | 488 | 520 |
| Colombia | 350 | 745 | 623 | 467 | 207 |
| El Salvador | | 620 | 287 | 283 | 759 |
| Other | 569 | 1 396 | 414 | 284 | 468 |
| Total | 78 584 | 92 324 | 93 064 | 91 727 | 95 967 |

Source: *FAO Yearbook*

2 ARGENTINA

2.1 Main species considered

| Spanish name | English name | Latin name |
|--------------|---------------|---|
| Tiburón | Shark | <i>Hexanchus</i> spp., <i>Squalus</i> spp., <i>Carcharhinus</i> spp., <i>Alopias</i> spp. |
| Gatuso | Smooth-hound | <i>Mustelus schmitti</i> |
| Cazón | Vitamin shark | <i>Galeorhinus vitaminicus</i> |
| Raya | Skate | <i>Raja</i> spp |
| Pez ángel | Angelsbark | <i>Squatina argentina</i> |

2.2 Catches

The main fishery resources of Argentina are hake (*Merluccius hubbsi*), squid (*Illex argentinus*), anchovy (*Engraulis anchoita*), and red shrimp (*Pleoticus muelleri*). The inshore species, croaker (*Micropogon furnieri*) and seatrout (*Cynoscion striatus*) are also significant as during recent years their products have gained a larger international market. In this context, sharks and rays do not represent more than an incidental appearance from these major exploitations, apart from a small volume obtained by artisanal scale operations.

Table 3 Argentina: Catches of main shark species 1992-1997 (tonnes)

| Species | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---------|--------|--------|--------|--------|--------|--------|
| Tiburón | 4 013 | 2 091 | 1 760 | 2 229 | 2 251 | 1 060 |
| Gatuso | 10 387 | 11 334 | 11 719 | 11 057 | 10 252 | 9 938 |
| Cazón | 58 | 230 | 75 | 104 | 92 | 103 |
| Total | 14 458 | 13 655 | 13 554 | 13 390 | 12 595 | 11 101 |

Source: Subsecretaría de Pesca

Taking the year of 1996 as a reference point and adding to Table 3 the catch figures for angelsbark (4 278 tonnes) and skate (12 444 tonnes), cartilaginous species totalled 29 317 tonnes from a total catch of 1 225 958 tonnes, which represents 2.39%.

2.3 Industrialisation

The following products can be obtained from smooth-hound and vitamin shark:

- Whole
- Eviscerated
- Headed-and-gutted
- Fillets
- Fins

These products, fillets in particular, present a number of processing and commercial features:

- proper size
- absence of bones
- high yield
- low fat content

2.3.1 Applied technologies

Fresh-chilled

This is the form for whole, eviscerated, headed-and-gutted and fillets when the products are destined for the domestic market and when they are exported to countries within the region.

Frozen

This technology is applied to the same products when their destination is outside the region. Like fresh-chilled production, this process is carried out at authorised plants, which are mostly situated in the city of Mar del Plata.

Dried-salted

The amount of this produced is almost insignificant. It is made on an artisanal scale and is only important during the Lent period for Holy Week sales and as a substitute for Norwegian klipfish. Kingclip is used as well as smooth-hound.

Dried

This is the product form for fins. Although only a sub-product, fins are high-priced due to the great demand from Asian markets. Fins generally arrive at the dock almost as an end product and are traded by brokers who buy them directly on the dock.

2.4. Markets

2.4.1 Domestic markets

Only in the main cities, in fact almost exclusively in Buenos Aires and its surroundings, is there a trade in products made from cartilaginous species. Fresh fillets are sold at fish shops and supermarkets. Smooth hound is the species used most, although in some periods angelshark fillets and skate wings are common as well. Table 4 shows the results of a recent public opinion poll (1995) regarding consumer preferences.

Table 4 Consumer preferences in the city of Buenos Aires

| Species | Consumer preference (%) |
|------------------------|-------------------------|
| Hake | 60.3 |
| Squid | 7.7 |
| Smooth-hound | 4.1 |
| Kingclip | 3.5 |
| Angelshark | 3.1 |
| Croaker and salmon | 2.5 |
| Grouper | 2.4 |
| Pez palo | 2.0 |
| Sea trout and flounder | 1.5 |
| Other | 12.9 |

Source: INIDEP

Although preferences for the considered species are low, the fact that 60% prefer hake has to be taken into account. In this market, filets of gatuso cost the same as boneless filets of hake (around US\$4/kg), sometimes even more.

2.4.2 Export markets

The southern European countries, mainly Italy and Spain, have been the main importing nations for shark and smooth-hound products during recent years. Within the region, Brazil is the principal buyer for these Argentine products. In terms of value, the main exporting markets are the Asian countries, mainly Hong Kong and China.

Table 5 Annual exports of shark, cazón and gatuso from Argentina

| SPECIES | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | |
|---------|-------|-------|-------|-------|-------|-----|-------|-------|-------|-------|-------|-----|
| | V | Q | V | Q | V | Q | V | Q | V | Q | V | Q |
| Cazón | 2 929 | 1 396 | 1 892 | 1 059 | 1 142 | 521 | 1 355 | 579 | 1 201 | 598 | 506 | 283 |
| Gatuso | 1 370 | 540 | 1 619 | 484 | 1 572 | 453 | 1 521 | 583 | 1 403 | 566 | 871 | 423 |
| Shark | 339 | 18 | 418 | 17 | 340 | 10 | 885 | 19 | 677 | 20 | 451 | 19 |
| Total | 4 638 | 1 954 | 3 929 | 1 560 | 3 054 | 984 | 3 761 | 1 181 | 3 281 | 1 184 | 1 828 | 725 |

Source: Subsecretaría de Pesca

(Q=tonnes, V=US\$ 1 000)

Based on these figures, considering that Argentina exported 659 588 tonnes of fishery products with a value of US\$1 000 million in 1996, the exports of gatuso, cazón and shark products represented 0.17% by volume and 0.3% in value of all fisheries products. Frozen headed-and-gutted and fillets are the main exported products derived from cazón and gatuso. Brazil, Italy and Spain are the main buying nations.

Table 6 Average FOB prices for selected products during the last six years

| Species | Product | US\$ per tonne | Destination |
|--------------|--------------------------|----------------|-------------|
| Smooth-hound | Frozen headed-and-gutted | 1 785 | Italy |
| | | 1 061 | Brazil |
| | Frozen fillets | 2 040 | Italy |
| | | 1 641 | Brazil |
| | Dried fins | 12 325 | Hong Kong |
| Cazón | Frozen headed-and-gutted | 2 038 | Italy |
| | | 1 923 | Greece |
| | Frozen fillets | 1 523 | Brazil |
| Shark | Dried fins | 27 354 | Hong Kong |
| Ray * | Frozen wings | 2 500 (C&F) | Italy |

Source: Subsecretaría de Pesca, except for*

* Source: INFOPECA, Noticias Comerciales

According to Table 6 the international prices for the meat of these types of shark is very close to those of hake; even higher in some markets.

2.5 Legislation

There are no specific regulations on sharks and rays catches except for those that determine a total allowable catch (TAC).

3 CHILE

3.1 Main species considered

| Spanish name | English name | Latin name |
|-----------------|---------------|--------------------------|
| Tiburón marrajo | Shortfin mako | <i>Isurus oxyrinchus</i> |
| Azulejo | Blue shark | <i>Prionace glauca</i> |
| Tollo | Smooth-hound | <i>Mustelus mento</i> |
| Raya | Skate | <i>Raja</i> spp. |

3.2 Catches

Small pelagics are the most abundant resources in the national catch, namely anchovy (*Engraulis ringens*), horse mackerel (*Trachurus murphyi*) and sardines (*Sardinops sagax* and *Clupea betincki*). There is not any commercially relevant fishing fleet which is dedicated to catching sharks and their related species. Landings of these species result from incidental catches, mostly as bycatch from sword fishing.

Table 7 Chile: Catches of main shark species 1991-1996 (tonnes)

| Species | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---------|-------|-------|-------|-------|-------|-------|
| Raya | 1 171 | 1 239 | 1 971 | 2 899 | 2 622 | 2 679 |
| Marrajo | 1 118 | 702 | 581 | 450 | 475 | 320 |
| Tollo | 937 | 481 | 398 | 588 | 193 | 225 |
| Azulejo | 212 | 175 | 237 | 33 | 39 | 11 |
| Total | 3 438 | 2 597 | 3 187 | 3 970 | 3 329 | 3 235 |

Source: Anuario Estadístico, SERNAPECA

Total catches have remained fairly stable throughout this period. However, there is a diminution in landings of all species except ray. Considering total fisheries landings, the percentages of cartilaginous species are insignificant, as shown in Table 8.

Table 8 Cartilaginous species as a proportion of total landings in Chile

| Year | Total Landed (tonnes) | Percentage of sharks and rays |
|------|-----------------------|-------------------------------|
| 1991 | 6 166 081 | 0.055 |
| 1992 | 6 628 365 | 0.039 |
| 1993 | 6 190 648 | 0.050 |
| 1994 | 8 021 043 | 0.049 |
| 1995 | 7 890 242 | 0.042 |
| 1996 | 7 232 679 | 0.044 |

3.3 Industrialisation

The same products can be obtained in Chile as in Argentina but, since the species in Argentina are generally larger, the production of filets is much lower. Therefore, the most common products are "troncos" (headed-and-gutted) and "rodajas" (steaks). Dried-salted and dehydrated products are almost exclusively fins.

3.4 Markets

3.4.1 Domestic markets

Although there is no up-to-date research on the domestic market for fishery products in Chile, there is a general opinion that shark products scarcely appear in this market place. The reasons for this are the low catches and the easy availability of other higher-valued and preferred species, which are used for sophisticated cooking; one of Chile's most attractive tourist points. Unlike the neighbouring countries, there is no practice of producing a "national klipfish" from sharks. Fresh fish is the only form in which shark is sold, often with the deceitful labelling as swordfish.

3.4.2 Export markets

Skate wings are exported frozen. Spain, Republic of Korea and France are the main buyers. Shark species (marrajo, azulejo, tollo) are mainly exported as frozen headed-and-gutted and steaks to Italy, Netherlands, Spain, Germany, Japan and the United States while the dried fins go to Hong Kong, Japan, Singapore, Taiwan Province of China and Uruguay. There are also some exports of fresh-chilled products to the United States and of salted-dried cuts to other countries in the region: Brazil, Ecuador, and Bolivia.

Table 9 Exports of ray and shark products from Chile

| | 1993 | | 1994 | | 1995 | | 1996 | | 1997 (Jan-Nov) | |
|---------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------------|--------------|
| | V | Q | V | Q | V | Q | V | Q | V | Q |
| Raya | 2 136 | 1 420 | 4 343 | 2 371 | 5 420 | 2 948 | 4 494 | 2 278 | 4 347 | 1 954 |
| Marrajo | 804 | 240 | 696 | 268 | 1 011 | 199 | 634 | 121 | 1 147 | 159 |
| Azulejo | 254 | 42 | 581 | 136 | 162 | 20 | 215 | 41 | 69 | 27 |
| Tollo | 29 | 16 | 23 | 10 | 57 | 27 | 33 | 15 | — | — |
| Tiburón-unspecified | 332 | 42 | 371 | 61 | 358 | 65 | 456 | 46 | 544 | 38 |
| Total | 3 555 | 1 760 | 6 014 | 2 846 | 7 008 | 3 259 | 5 832 | 2 501 | 6 107 | 2 178 |

Source: IFOP

(V=US\$ 1 000, Q=tonnes)

Chile's total fishery products exports amounted to 1 520 775 tonnes worth US\$1 771 917 000 in 1996 so exports of shark and ray products represented 0.16% in terms of volume and 0.33% in value.

Prices are very variable and there are big differences between dried shark fin and chilled and frozen products.

Table 10 Examples of average FOB prices for different products during the last six years

| Species | Product | US\$/tonne | Destination |
|---------------------|--------------|------------|-------------------|
| Marrajo | Frozen | 1 867 | Spain |
| | | 1 886 | Italy |
| | | 2 364 | USA |
| | Chilled | 2 661 | USA |
| | Dried fins | 37 095 | Far East |
| Tiburón unspecified | Frozen | 2 567 | Germany |
| | | 2 708 | Spain |
| | Chilled | 2 255 | USA |
| | Dried fins | 37 731 | Far East |
| Azulejo | Frozen | 792 | Netherlands |
| | | 541 | Germany |
| | | 1 300 | Spain |
| | Dried fins | 35 062 | Asia |
| Tollo | Frozen | 2 785 | New Zealand |
| | | 1 329 | France |
| | | 1 065 | Spain |
| Raya | Frozen wings | 1 913 | Republic of Korea |
| | | 1 856 | France |
| | | 1 398 | Spain |

Source: IFOP

3.5 Legislation

The Fisheries Under-secretary established maximum quotas by fishing season (decree 557/1997), along with the suspension of new authorisations to industrial vessels (decree 601/1997).

4 MEXICO

4.1 Main species considered

| Spanish name | English name | Latin name - genus |
|--------------|----------------------|--|
| Tiburón | Shark | <i>Prionace</i> ; <i>Carcharhinus</i> ; <i>Isurus</i> ; <i>Galeocerdo</i> ; <i>Alopias</i> . |
| Cazón | Smooth-hound/Dogfish | <i>Mustelus</i> ; <i>Sphyrna</i> ; <i>Rhizoprionodon</i> ; <i>Squalus</i> |
| Raya | Skate | <i>Raja</i> ; <i>Gymnura</i> ; <i>Dasyatis</i> ; <i>Rhinoptera</i> |
| Manta | Devilfish | <i>Mobula</i> ; <i>Manta</i> |

The resources that are considered are classified under the denomination "tiburón y cazón". However, rays and related species are considered within the group "escama en general" and thus classified together with some non-cartilaginous species. Therefore, in the list above there are many genera.

4.2 Catches

The main fishery resources in Mexico are tuna, squid, sardine, and shrimp. Sharks and rays are some 3% of the total production, as shown in Table 11.

Table 11 Mexico: Annual catches of shark, smooth hound and rays (live weight, tonnes)

| Year | Smooth hound | Rays | Shark | Total | Percentage of total fisheries |
|------|--------------|--------|--------|--------|-------------------------------|
| 1993 | 13 190 | * | 23 119 | 36 309 | 3.76 |
| 1994 | 11 531 | * | 23 824 | 35 355 | 3.52 |
| 1995 | 11 074 | * | 21 501 | 32 575 | 3.15 |
| 1996 | 11 024 | * | 22 445 | 33 469 | 2.89 |
| 1997 | 7 299 | 12 701 | 16 929 | 36 929 | 3.06 |

Source: Dirección de Estadística y Registros Pesqueros

*information not available

As mentioned previously, rays are classified together with other fish as "escamas". However, it is very significant that, when catches started to be considered individually, the total figures for cartilaginous fishes remained at the same level and there is a diminution in the group "cazónes y tiburones". All this leads to the conclusion that rays and related species had already been considered within that group.

4.3 Industrialisation

The products obtained are mostly headed-and-gutted, steaks and fillets, which are sold chilled, frozen or dried-salted, depending on their destination. Other products are also utilised: the liver for shark liver oil extraction, residues as the base for shark fishmeal production, the skin is an object of further industrialisation and the dried shark fins are traded in the Oriental markets. Skate wings are also used, applying the same preserving technologies described previously.

During 1996, 11 778 tonnes of raw material of "cazón" and "tiburón" were processed, which resulted in 3 895 tonnes of net weight production. These quantities are broken down as follows:

| Process | Raw material (tonnes) | Product (tonnes) | Yield (%) |
|-----------------|--------------------------|---------------------|--------------|
| Frozen | 10 823 | 3 525 | 32.5 |
| Other processes | 955 | 370 | 38.7 |
| Total | 11 778 | 3 895 | 33.0 |

Source: Anuario Estadístico de Pesca 1996

For the last six years the quantities of raw material (tiburones and cazónes) utilised and the products obtained have remained stable.

Table 12 Mexico: Annual production from cazónes and tiburones

| Year | Raw material (tonnes) | Net production (tonnes) | Yield (%) |
|------|-----------------------|-------------------------|-----------|
| 1991 | 12 170 | 3 996 | 28 |
| 1992 | 13 864 | 4 556 | 33 |
| 1993 | 14 116 | 4 644 | 33 |
| 1994 | 14 218 | 4 678 | 33 |
| 1995 | 11 270 | 3 728 | 33 |
| 1996 | 11 778 | 3 895 | 33 |

Source: Anuario Estadístico de Pesca 1996

4.4 Markets

4.4.1 Domestic markets

The domestic market uses a large proportion of the landings. The main wholesale market in Mexico is La Nueva Vega. In Table 13 the quantities traded during the last two years are shown.

Table 13 Incoming volumes to La Nueva Viga market (kilogram gross landed weight)

| Year | Total | Tiburón | Cazón | Raya |
|------|-----------|-----------|---------|---------|
| 1996 | 1 657 011 | 519 273 | 677 440 | 460 298 |
| 1997 | 2 592 720 | 1 196 845 | 852 571 | 543 304 |

Source: Servicio Nacional de Información de Mercados.

The periods of highest consumption are New Year and Easter. Fresh fillets are the most common form consumed, although fillets are offered in a salted dried form as well, as a substitute for imported cod klipfish.

Table 14 Apparent and per-capita domestic seafood consumption during 1996 in Mexico

| Species/Usage | Consumption | |
|-----------------------------------|-------------------|-----------------|
| | Apparent (tonnes) | Per capita (kg) |
| Tiburón and cazón | 28 564 | 0.30 |
| Squid | 62 369 | 0.66 |
| Shrimp | 26 124 | 0.28 |
| Mojarra | 91 171 | 0.97 |
| Oysters | 38 901 | 0.41 |
| Sardine and mackerel | 79 806 | 0.85 |
| Tuna | 87 697 | 0.93 |
| "Escama" | 204 814 | 2.17 |
| Molluscs and crustaceans | 28 569 | 0.30 |
| Other | 201 930 | 2.14 |
| Subtotal direct human consumption | 849 945 | 9.01 |
| Indirect human consumption | 231 607 | 2.46 |
| Total | 1 081 552 | 11.47 |

Source: Anuario Estadístico de Pesca 1996

4.4.2 Export markets

The USA and Republic of Korea are the main export markets for shark products, which in the official statistics are grouped under the term "escualos". These exports are classified under the forms fresh-chilled and frozen, with no registers for dried and dehydrated, where the shark fins belong.

Table 15 Exports of shark products from Mexico during 1996

| Escualos | Value (US\$) | Quantity(tonnes) | US\$/tonne | Destination |
|--------------|----------------|------------------|--------------|-------------------|
| Frozen | 7 888 | 10.42 | 757 | USA |
| Chilled | 874 120 | 769.00 | 1 136 | USA |
| | 1 461 | 2.70 | 541 | Republic of Korea |
| Total | 883 469 | 782.12 | 1 129 | |

Source: Dirección General de Aduanas. SHCP

Using these figures, and taking into account that in 1996 Mexico exported a total of 261 523 tonnes of fishery products worth US\$798 073, the exports of shark and ray products represent 0.30% in terms of volume and 0.01% in value.

4.5 Legislation

The National Consultative Committee for Responsible Fishery issued an advertisement which established for an indefinite time a fishing ban on devilfish in an area 12 nautical miles around the Revilla Gigedo archipelago and Guadalupe Islands. That is the only specific regulation in this respect. However, SERMANAP has stopped issuing new fishing licences for shark and smooth hound since 1993. Only renewal of existing permits is allowed.

Rays and related species are considered under the item "Escama in General" and a new specific rule that regulates their exploitation is predicted for this year.

5 PERU

5.1 Main species considered

| Spanish name | English name | Latin name |
|--------------------------|---------------|--------------------------|
| Tiburón marrajo/diamante | Shortfin mako | <i>Isurus oxyrinchus</i> |
| Tiburón azul | Blue shark | <i>Prionace glauca</i> |
| Tollo | Smooth-hound | <i>Mustelus whitneyi</i> |
| Tiburón ballena | Whale shark | <i>Rhinodon typus</i> |

5.2 Catches

Peru is one of the chief fishing nations and has been amongst the first for many years. Its main fishery resources are small pelagic: anchovy (*Engraulis ringens*), horse mackerel (*Trachurus murphyi*), mackerel (*Scomber japonicus*) and sardine (*Sardinops sagax*). Catches of hake (*Merluccius gayi*) must also be included due to its increasing volume.

Table 16 shows the yearly catches of sharks and their relation to the total catch. It must be concluded that shark landings are almost insignificant within the general context of the Peruvian fisheries.

Table 16 Shark landings as a percentage of total fisheries in Peru

| Year | Total landed (tonnes) | Shark landings (tonnes) | Percentage |
|------|-----------------------|-------------------------|------------|
| 1992 | 7 595 400 | 2 087 | 0.027 |
| 1993 | 9 138 100 | 1 212 | 0.013 |
| 1994 | 12 168 200 | 548 | 0.004 |
| 1995 | 9 022 300 | 694 | 0.007 |
| 1996 | 9 585 700 | 1 566 | 0.016 |

Source: Ministerio de Pesquería

5.3 Industrialisation

During the five years under consideration about 70% of shark landings went to fresh-chilled production, 29.4% were frozen and the remaining 0.6% was processed into cured products (dried, salted-dried, etc.) Fresh-chilled products, mainly fillets, are destined for the domestic market. Frozen products are presented mainly as headed-and-gutted, individually-quick-frozen, individually-wrapped-in-plastic products, and they are exported. Salted-dried products are usually fillets and sold on the domestic market.

The processing of other products is also mentioned, for instance shark fin, shark liver oil, teeth and cartilage, but with no relevant registers of their production.

5.4 Markets

5.4.1 Domestic market.

The higher trading share for fresh-chilled products compared with other products demonstrates that the domestic market absorbs most of the shark landings, as frozen products go to export markets. Whole fish and fillets comprise most of the fresh-chilled offers. The inshore towns are the main market place. Cured products are chiefly consumed during Holy Week, which could be the reason for such a low rate of production.

5.4.2 Export markets.

The main buyer for Peruvian shark products is Spain. Until recently there was also a flow of trade toward Italy. The most representative product is frozen headed-and-gutted individually wrapped in plastic bags. The last quotation to the European market was US\$2 300/tonne, C&F.

Table 17 Annual exports of shark products from Peru by destination (tonnes)

| Destination | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---------------|------|------|------|------|------|------|------|
| Spain | 36 | 80 | 165 | 186 | | 22 | 53 |
| United States | 15 | | | | 7 | | |
| Japan | | | | 26 | 16 | | |
| Italy | | | | | 1 | | |
| Germany | | | | | | | 4 |
| Sweden | | | | | | 10 | 6 |
| Total | 51 | 80 | 165 | 212 | 24 | 32 | 63 |

Source: Ministerio de Pesquería

Taking into account that exports of fishery products averaged 1 690 000 tonnes during the period 1990-1995, it can be concluded that the quantities of shark products exported have been insignificant.

6 COSTA RICA

6.1 Main species considered

| Spanish name | English name | Latin name | Commercial group |
|----------------|----------------|-------------------------------|------------------|
| Tiburón zorro | Thresher shark | <i>Alopias superciliosus</i> | Posta blanca |
| Tiburón gata | Nurse shark | <i>Ginglymostoma cirratum</i> | Chatarra |
| Tiburón mamón | Smooth-hound | <i>Mustelus spp</i> | Cazón |
| Tiburón tigre | Tiger shark | <i>Galeocerdo cuvieri</i> | Posta blanca |
| Tiburón bonito | Shortfin mako | <i>Isurus oxyrinchus</i> | Mako |
| Cornuda blanca | Bonnethead | <i>Sphyrna tiburo</i> | Posta blanca |
| Raya | Skate | <i>Dasyatis longus</i> | Raya (chatarra) |

The commercial statistics are orientated to the product's usage.

6.2 Catches

Although Costa Rica has coasts on both oceans, all its fishery resources except Atlantic lobster are caught from the Pacific coast. In terms of value, the top fishery resources in Costa Rica are snappers, mahi-mahi, shrimp and tuna.

Table 18 Costa Rican catches of shark and ray from both oceans (tonnes)

| Commercial group | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---------------------|-------|-------|-------|-------|-------|-------|-------|
| Cazón | 603 | 543 | 837 | 1 016 | 1 503 | 1 620 | 1 022 |
| Posta | 951 | 818 | 921 | 715 | 881 | 930 | 698 |
| Mako | 66 | 152 | 136 | 91 | 80 | 51 | 34 |
| Thresher | --- | --- | 240 | 453 | 521 | 508 | 194 |
| Total shark and ray | 1 620 | 1 513 | 2 134 | 2 275 | 2 985 | 3 109 | 1 948 |

Source: Departamento de Estadística-INCOPECA

There is a gradual increase in shark and ray landings from 1990 to 1995 followed by a sharp drop. Table 19 shows these landings as a percentage of the total annual catch, which demonstrates that, unlike other countries in the region, the shark and ray catch is worth consideration.

Table 19 Sharks and rays as a percentage of total landings in Costa Rica

| Year | Total landings (tonnes) | Percentage of sharks and rays |
|------|-------------------------|-------------------------------|
| 1990 | 17 553 | 9.22 |
| 1991 | 17 905 | 8.45 |
| 1992 | 18 096 | 11.79 |
| 1993 | 18 895 | 12.04 |
| 1994 | 20 849 | 14.31 |
| 1995 | 27 928 | 11.13 |

6.3 Industrialisation

The main product is "posta de tiburón", which, according to the terminology used in the country, represents the fish with its head and fins off. After taking off the main products the cartilage and dried-processed fins can be obtained, but these are of lesser importance. Teeth, skin and liver are not used on an industrial scale.

6.4 Markets

6.4.1 Domestic markets.

There are neither registers nor information in this respect.

6.4.2 Export markets.

Exports of shark products are mostly destined for the USA, Canada and Hong Kong.

Table 20 Some prices of shark exports 1997-1998 (US\$/tonne)

| Species | Aug 97 | Sept 97 | Oct 97 | Nov 97 | Dec 97 | Jan 98 | Average price |
|----------------|--------|---------|--------|--------|--------|--------|---------------|
| Tiburón azul | 2 752 | 2 737 | 2 033 | 2 549 | 2 430 | 2 550 | 2 458 |
| Tiburón zorro | 3 770 | 4 123 | 3 357 | 3 750 | 3 462 | 3 078 | 3 590 |
| Tiburón blanco | 3 865 | 3 520 | 3 069 | 2 480 | --- | --- | 3 233 |
| Posta blanca | --- | 4 526 | --- | --- | --- | --- | 4 526 |
| Mako | --- | --- | 329 | 356 | --- | --- | 342 |

Source: Depto. de Mercadeo-INCOPESCA

These prices refer basically to a frozen eviscerated product whose destination is the United States, Canada and Europe. The thresher shark is included among a wide range of fresh-chilled fishery products that Costa Rica exports by-air to the Miami market. For prices of these see Table 21.

Table 21 Extract from INFOPESCA Noticias Comerciales, Issue of April 5, 1998

| Species | Product | Prices (US\$/lb)* | Reference | Destination |
|--|--------------------------------|-------------------|-----------|-------------|
| Pez zorro (<i>Alopias vulpinus</i>) | headed-and-gutted, refrigerado | 1.54/lb | C&F Miami | USA |
| | Lomo c/piel, refrigerado | 2.32/lb | | |
| | Lomo s/piel, refrigerado | 2.42/lb | | |

*1lb=0.45kg

6.5 Legislation

There are two rules in force:

- Agreement A.J.D.I.F./270-97, of October 22, 1997, which rules the shark fishery and trading: the norms say that during the fishery operations of shark, the whole specimen must be utilised.
- Agreement A.J.D.I.P. of November 26, 1997, which rules the granting of new licences for deep-sea fisheries, and aims to reducing the fishing effort for sharks.

7 BRAZIL

7.1 Main species considered

| Spanish name | English name | Latin name |
|---------------|----------------|--------------------------------|
| Cação Anjo | Angel shark | <i>Squatina</i> spp. |
| Raia | Skate | <i>Raja</i> spp. |
| Raia Viola | Guitar fish | <i>Rhinobatos horkelli</i> |
| Caçonete | Smooth-hound | <i>Mustelus</i> spp. |
| Cação Frango | Vitamin shark | <i>Galeorhinus vitaminicus</i> |
| Cação Martelo | Hammerhead | <i>Sphyrna</i> spp. |
| Cação Azul | Blue shark | <i>Prionace glauca</i> |
| Cação Anequim | White shark | <i>Carcharodon carcharias</i> |
| Cação raposa | Thresher shark | <i>Alopias superciliosus</i> |
| Cação panan | Whitetip shark | <i>Carcharhinus longimanus</i> |
| Cação toninha | Night shark | <i>Carcharhinus signatus</i> |
| Cação jaguar | Sandbar shark | <i>Carcharhinus plumbeus</i> |
| Cação cavala | Shortfin mako | <i>Isurus oxyrinchus</i> |

7.2 Catches

Fish species are very numerous in Brazil, due to its very wide coastal areas. The lack of up-to-date national statistics for fisheries is the reason why data are presented in two different tables. Table 22 shows catches of sharks and rays in the south and south-east regions for 1995 and Table 23 shows national catches but for 1994.

Table 22 1995 Catches of sharks and related species off Brazil's south and south-eastern states (kg)

| Species | Rio Grande do Sul | Santa Catarina | Paraná | Sao Paulo | Rio de Janeiro | Total |
|--------------------|-------------------|------------------|---------------|------------------|----------------|------------------|
| Cações nei | 1 869 577 | 981 681 | 11 766 | 1 348 373 | 467 973 | 4 679 370 |
| Cação Anjo | 777 624 | 371 411 | 259 | 113 314 | 4 048 | 1 266 656 |
| Raia | 245 532 | 139 884 | 295 | 31 503 | 250 448 | 667 662 |
| Raia Viola | 162 151 | 195 968 | 1 320 | 57 721 | 164 614 | 581 774 |
| Caçonete | - | 359 363 | 1 489 | - | - | 360 852 |
| Violinha | 348 254 | - | - | - | - | 348 254 |
| Cação Frango | - | 278 206 | - | - | - | 278 206 |
| Cação Martelo | 69326 | 126 595 | 2 541 | - | - | 198 462 |
| Cação Azul | 89 875 | 5 167 | - | - | - | 95 042 |
| Cação Cinza | 67 970 | - | - | - | - | 67 970 |
| Cação Mangona | 17 153 | 40 914 | 243 | - | - | 58 310 |
| Cação Anequim | 17 002 | 30 436 | 113 | - | 663 | 48 214 |
| Cação Mouka | 18 020 | - | - | - | - | 18 020 |
| Cação Bico Doce | - | 17 395 | - | - | - | 17 395 |
| Cação Cabeça Chata | - | 14 314 | - | - | 200 | 14 514 |
| Cação Rolicho | - | 13 363 | 266 | - | - | 13 629 |
| Cação Tintureiro | - | 1 469 | - | - | 670 | 2 139 |
| Cação Galhudo | - | 2 | 1 113 | - | - | 1 115 |
| Raia Sapo | - | - | 1 016 | - | - | 1 016 |
| Cação Galha Preta | - | - | - | - | 20 | 20 |
| Total | 3 682 484 | 2 576 168 | 20 421 | 1 550 911 | 888 636 | 8 718 620 |

Source: IBAMA

Table 23 1994 Brazilian catches of sharks and rays by region (tonnes)

| Region | Sharks | Rays | Total |
|--------------|---------------|--------------|---------------|
| North | 3 515 | 1 629 | 5 144 |
| North East | 1 710 | 1 357 | 3 067 |
| South East | 4 882 | 850 | 5 732 |
| South | 10 102 | 1 135 | 11 237 |
| Total | 20 209 | 4 971 | 25 180 |

Source: CEPENE

7.3 Industrialisation

Shark landings are highly utilised. Almost 90% of landings are sold as fresh-chilled fish, from simple eviscerated to fillets. Freezing technology is only applied for export. Processing of dried-salted skate and angelfish wings is widespread.

Although imported dried-salted products, namely cod and saithe klipfish, are economically accessible (Brazil is one of the biggest importers of Norwegian cod klipfish), the salted-dried shark fillets are very traditional and enjoy a good demand from the domestic market as well.

7.4 Markets

7.4.1 Domestic market

There is a strong domestic market for shark products, mainly for fresh-chilled products. Eviscerated products are mainly offered on the wholesale markets in Sao Paulo and Rio de Janeiro.

Table 24 Extract from INFOPECA Noticias Comerciales, edition of April 20, 1998

| Especies | Producto | US\$/kg | Mercado |
|---|---------------------|---------|--------------------------|
| Gatuso <i>Mustelus schmitti</i> | Entero, refrigerado | 1.04 | Mayorista São Paulo |
| Cazón <i>Galeorhinus vitaminicus</i> | Entero, refrigerado | 2.17 | |
| Pez ángel <i>Squatina</i> spp | Entero, refrigerado | 1.73 | |
| | | 2.56 | Mayorista Rio de Janeiro |

At the level of the final consumer, the "cação" is among the four most preferred species in the free street markets of Sao Paulo. The other three are seatrout, croaker and hake. In Rio de Janeiro "cação" and "viola" (guitarfish) are commonly sold in street markets, fish shops and supermarkets. As can be seen from Table 25, their prices are very similar to other widely-consumed species:

Table 25 1997 Prices for various fish in Rio de Janeiro (US\$/kg)

| Species | Street markets | Fish shops | Supermarkets |
|----------|----------------|------------|--------------|
| Grouper | 12.38 | 13.21 | |
| Kingelip | 14.67 | 10.09 | |
| Hake | | 3.94 | 2.42 |
| Seatrout | 4.58 | 8.6 | 7.24 |
| "Cação" | 4.58 | 5.73 | 5.03 |
| "Viola" | 8.07 | 10.45 | 9.08 |

Source: *El mercado de pescados en Rio de Janeiro- INFOPECA*

7.4.2 Export markets

In the past there were some exports of frozen eviscerated, head-off shark to Italy, mainly from plants situated in the city of Rio Grande (in the state of Rio Grande do Sul). At present, due to the intense demand from the domestic market that usually pays better prices than the overseas buyers, exports are not worth consideration.

8 URUGUAY

8.1 Main species considered

| Spanish name | English name | Latin name |
|-------------------|------------------|---------------------------|
| Moro | Shortfin mako | <i>Isurus oxyrinchus</i> |
| Tiburón azul | Blue shark | <i>Prionace glauca</i> |
| Sarda | Sand tiger shark | <i>Eugomphodus taurus</i> |
| Gatuso | Smooth-hound | <i>Mustelus schmitti</i> |
| Trompa de cristal | Vitamin shark | <i>Galeorhinus galeus</i> |
| Galludo | Dogfish | <i>Squalus acanthias</i> |
| Angelito | Angelfish | <i>Squatina argentina</i> |
| Raya | Skate | <i>Raja flavirostris</i> |

8.2 Catches

The main resources are hake (*Merluccius hubbsi*), croaker (*Micropogon furnieri*), seatrout (*Cynoscion striatus*) and squid (*Illex argentinus*)

Cartilaginous fishes are caught as a bycatch both from inshore and deep-sea industrial fleets. There is still an artisanal scale exploitation but, as well as being very small, it has been decreasing steadily during the last few years. Their fishing season is limited to a few months of summer and its production is oriented almost exclusively to the production of a "bacalao nacional" (national klipfish).

Table 26 Annual catches of shark and related species in Uruguay (tonnes)

| Species | 1992 | 1993 | 1994 | 1995 | 1996 |
|--------------------|-------|-------|-------|-------|-------|
| Tiburones, cazónes | 649 | 711 | 814 | 1 335 | 1 494 |
| Smooth-hound | 343 | 329 | 319 | 286 | 204 |
| Raya | | 128 | 1 032 | 1 469 | 2 614 |
| Galludo | 54 | 12 | 52 | 138 | 109 |
| Angelito | 94 | 49 | 42 | 35 | 82 |
| Moro | 14 | 9 | 2 | 17 | 34 |
| Sarda | 19 | 9 | 22 | 10 | 15 |
| Other | 1 | | 4 | 283 | 615 |
| Total | 1 174 | 1 247 | 2 287 | 3 573 | 5 167 |

Source: INAPE

The increasing number of tuna longliners that began to operate from 1993-94 explains the steady rise in catches. Total fish catch in 1996 was 123 276 tonnes, so cartilaginous fishes represented 4.19%.

8.3 Industrialisation

During World War II Uruguay exported shark liver oil as a raw material for the production of vitamin A. The chosen species was "Trompa de cristal" but, due to its low reproductive rate, this could not withstand the intense fishing level suffered latterly and the resource is therefore approaching collapse. However, the product has not been exported since 1947 when vitamin A could be produced by synthetic means.

The artisanal processing of "bacalao nacional" has become quite widespread but its consumption is limited to Holy Week, more particularly to Good Friday. Recently the production of salted-dried has been decreasing, from 100 tonnes per season in the past to a current production of only 20 tonnes.

Fresh-chilled shark trading started to develop, mainly in fillets, which compete against traditional species. The development of the frozen hake industry from the 1970s brought the production of frozen headed-and-gutted shark for export to Europe.

In the frame of the agreements between vessel owners and crews, the latter have a right to a determined percentage of the vessel's catches ("la valija") as well as the already dried shark fins that have been collected during the voyage. Practically fifty per cent of these shark fins are sold directly to dealers or intermediaries at the dock, almost always evading the custom controls.

8.4 Markets

8.4.1 Domestic market

The most traded product is the smooth bound fillet (using "gotuso" as a raw material). The consumption of this product is very extensive. It is placed second in the ranking of consumer preferences, following hake fillet, which accounts for 45-65%, and its prices at fish shops, street markets and supermarkets is the same as that for hake (US\$2.47/kg). The other way in which it is presented is as chilled and frozen steaks of mako, sand tiger shark and blue shark. However, these are not sold as "shark", but as tuna and or swordfish instead, in a frequent fraud against consumers.

The supply of the salted-dried product ("bacalao nacional"), as mentioned before, has diminished during the last few years. There are two reasons for this trend. As in the rest of the region, the new generations do not maintain the tradition and the genuine Norwegian klipfish is currently cheaper than it used to be. In a shop belonging to a main supermarket chain the national product fetches US\$9/kg. The imported product, presumably cod but it could be saithe, costs US\$12/kg. With such a little price difference, and this consumption being limited to one day in particular, many consumers choose the imported product.

8.4.2 Export markets.

Skate products have bulked large in exports during 1996. The main destination was Republic of Korea, which bought 2 241 tonnes of frozen skate wings from Uruguay.

Shark exports were mainly oriented to Brazil (see Table 27), with a few shipments to Germany (26 tonnes of cazóns and tiburones), United States and Puerto Rico. It is worthy of note that no substantial exports to Southern European countries (Spain, Italy and Greece) have been reported for many years. These countries used to be strong buyers of frozen headed-and-gutted shark.

Table 27 Exports of shark and ray products to Brazil from Uruguay

| Species | Products | Quantity (tonnes) | Value (US\$) | Price US\$/tonne |
|--------------|----------------------------------|-------------------|----------------|------------------|
| Angelito | Whole, fresh-chilled | 22 | 7 738 | 355 |
| | Eviscerated, fresh-chilled | 66 | 31 940 | 485 |
| | Eviscerated, frozen | 5 | 2 374 | 429 |
| Cazón | Whole, fresh-chilled | 38 | 19 228 | 500 |
| | Eviscerated, fresh-chilled | 147 | 104 360 | 709 |
| | Whole, frozen | 5 | 1 317 | 243 |
| | Eviscerated, frozen | 132 | 137 564 | 1 044 |
| | Headed-and-gutted, frozen | 45 | 60 300 | 1 340 |
| | Fillet, frozen | 26 | 44 476 | 1 710 |
| Tiburón | Eviscerated, fresh-chilled | 12 | 14 266 | 1 151 |
| | Headed-and-gutted, fresh-chilled | 18 | 20 394 | 1 100 |
| | Whole, frozen | 4 | 3 300 | 800 |
| | Headed-and-gutted, frozen | 7 | 7 836 | 1 100 |
| Raya | Whole, frozen | 13 | 7 153 | 550 |
| Total | | 540 | 462 246 | 822 |

Source: INAPE

9 VENEZUELA

9.1 Main species

| Spanish name | English name | Latin name |
|---------------------|----------------|---|
| Tiburón/cazón | Shark | <i>Carcharhinus limbatus</i> , <i>Carcharhinus milberti</i> , <i>Rhizoprionodon lalandii</i> , <i>Rhizoprionodon porosus</i> , <i>Mustelus schmitti</i> |
| Tiburón carite | Shortfin mako | <i>Isurus oxyrinchus</i> |
| Tintorera | Tiger shark | <i>Galeocerdo cuvier</i> |
| Cazón/viuda | Smooth dogfish | <i>Mustelus canis</i> ; <i>Mustelus higmani</i> ; <i>Mustelus norrisi</i> |
| Cornúa/pez martillo | Hammerhead | <i>Sphyrna</i> spp |
| Chola | Guitarfish | <i>Rhinobatos percellens</i> |
| Raya | Skate | <i>Dasyatis americana</i> ; <i>Dasyatis geijskesi</i> |

9.2 Catches

The main maritime resources in Venezuela are small pelagics such as sardine (*Sardinella aurita*), tunas such as albacore (*Thunnus alalunga*) and skipjack (*Katsuwonus pelamis*) and groundfish such as croakers, snappers and groupers. There is a wide variety of bivalve shellfish with the clam "pepitona" (*Arca zebra*) being one of the main representatives. Shrimp (genus *Penaeus*) is the most important amongst crustaceans.

The species that are grouped within the denomination "cazón", represented 2% of maritime catches in 1994 with 6 600 tonnes, while rays contributed 0.6%. The majority of shark and rays catches are obtained by the industrial long-line fleet, as a bycatch of grouper and snapper fishing.

Table 28 Shark and ray catches in Venezuela (tonnes)

| Species | 1995 | 1996 |
|--------------------|--------|-------|
| Tiburón/cazón | 2 090 | 2 065 |
| Tintorera | 24 | 98 |
| Viuda | 182 | 158 |
| Cazones in general | 5 171 | 4 657 |
| Rayas | 2 450 | 1 812 |
| Aletas | 139 | 1 |
| Total | 10 056 | 8 791 |

Source: SARPI

9.3 Industrialisation

"Cazón" and rays both provide the raw material for the production of salted-dried products and, to a lesser extent, for fresh-chilled and frozen products. The processing of skate wings is done on board.

9.4 Markets

9.4.1 Domestic market

The only information available in this respect is focused on the consumption of fish and shellfish as compared to other protein sources, but with no breakdown of the seafood products.

9.4.2 Export markets

The official statistics do not distinguish shark and ray products from other species in the international markets because this item is considered among the code of duty imports for fresh/frozen fish.

10 CONCLUSION

After analysing the situation regarding catches, industrialisation, commercialisation and legislation for cartilaginous fishes in these eight Latin American countries it can be concluded that, although each one presents particular characteristics, there are many similarities between them.

10.1 Main species considered

There are some species or types that appear in the catch statistics of almost every country namely: mako, blue shark, smooth hound, dogfish and rays. There are also some genera that occur frequently even in countries whose coastlines are on different oceans (*Carcharhinus*, *Mustelus*, *Galeorhinus*, *Prionace*, *Isurus*, *Alopias*, *Squatina* and *Raja*). The relative position of each one among the volumes landed varies very much from one country to another but, in almost all cases, the flat species (rays, etc.) are the most abundant.

10.2 Catches

In all the studied cases, cartilaginous species are reported as bycatch resulting from industrial-scale fisheries of other target species. This means that the available information in many countries is not very abundant or specific. It is also very difficult to determine the percentages of discards.

The artisanal shark fisheries, which used to be a main way of living for fishermen in many countries, are in the process of disappearing.

Overall, shark landings have remained fairly stable. Some increases (Argentina, Uruguay), oscillations (Chile, Mexico, Costa Rica) and decreases (Peru) have been reported during the last few years. Also, with the exception of Costa Rica and Brazil, the percentages of cartilaginous fishes landed are very low with respect to total fish landings, so they have little significance.

10.3 Industrialisation

The quantity landed is highly utilised. Whole eviscerated, headed-and-gutted and fillets are products with a high yield. Technologies used are very simple and almost the same throughout the region, fresh-chilled, frozen, dried and salted-dried. The sub-products industry, namely teeth, skin, cartilage, fishmeal and fish oil are not of much relevance so far.

10.4 Markets

10.4.1 Domestic markets

Domestic demand for shark and ray meat is notoriously high in many countries (Argentina, Uruguay, Brazil, Mexico and Peru). Fresh-chilled fillets and salted-dried cuts are the most preferred. While fillets have their own market niches within the massive consumption sector, the latter are limited to seasonal consumption and as a substitute for imported products. On the other hand, steaks are sold in many of these countries under the name of more expensive products, principally tuna.

10.4.2 Export markets

Exports of shark products are reported for all countries despite the lack of very concrete statistics. There is an extensive range of cuts and presentation forms but whole eviscerated, headed-and-gutted and fillets, both fresh-chilled and frozen are the most common products.

Dried shark fins are the most quoted products. However, information on this aspect is very scarce due to the strong black-markets in their overseas trading.

10.5 Legislation

Regulations aiming to protect these resources are not common in the region, unlike other overexploited resources (small pelagics, groundfish, tuna and cephalopods) and some species considered as bycatch (dolphins and turtles).

Some measures have been taken only very recently and are restricted to the establishment of a TAC (Argentina and Chile), or the suspension of grants for new fishing licences (Chile, Mexico and Costa Rica).

Regarding specific fishing bans; only Mexico has issued a restriction for a species in particular while Costa Rica began to require the whole utilisation of landed sharks.

11 EXPORTERS OF SHARK PRODUCTS FROM LATIN AMERICA AND THE CARIBBEAN

11.1 Brazil

| | | |
|---|--|--|
| FURTADO S.A. Cx. Postal 1124 Tel: (55 532) 3622548 96200 Rio Grande-RS <i>Frozen shark</i> | LEAL SANTOS PESCADOS S.A. Cx. Postal 44 Tel: (55 532) 3325500 96200 Rio Grande-RS <i>Frozen shark, salted shark</i> | MARES DO SUL EXP. IMP. LTDA Ana Octavio Correa 184, 2° piso Tel: (55 11) 214115 11025 Estuario Santos-SP <i>Fresh-chilled shark, frozen shark</i> |
|---|--|--|

11.2 Colombia

| |
|--|
| PEZITAL LTDA. Cecilia García de Forero Km 4 al Pinal Tel: (57 222) 25428 Buenaventura <i>Shark cartilage</i> |
|--|

11.3 Costa Rica

| | | |
|---|--|--|
| CENTRAL EXPORTACIONES AGROINDUSTRIAL Miguel Valverde Tel: (506) 2843496 Fax: (506) 2768217 San José <i>Semi-processed shark fin</i> | CORPORACION PROCESADORA CARTIL Carlos Cantillo Tel: (506) 6630122 Fax: (506) 6630722 Puntarenas <i>Dried cartilage</i> | DESARROLLO PESQUERO DE CENTROAMERICA Rodolfo Alvarado Tel: (506) 2392591 Fax: (506) 2392591 Heredia <i>Dried shark fin and cartilage</i> |
| EXPUN S.A Héctor Fernandez Tel: (506) 2255236 Fax: (506) 2539205 San José <i>Fresh-chilled shark, dried shark fins</i> | INTERTEC S.A. Tel: (506) 2217831 Fax: (506) 2227055 Puntarenas/San José <i>Shark fins and dried cartilage</i> | LUIS CHEN MOK Luis Chen Mok Tel: (506) 6632751 Fax: (506) 6611957 Puntarenas <i>Shark fins and dried cartilage</i> |
| PREMAR Alexander Chan Tel: (506) 2264054 Fax: (506) 2278922 Alajuela <i>Cartilage</i> | PREPARADOS DEL MAR Yesenia Barrantes Tel: (506) 2226264 Fax: (506) 2212937 San José <i>Shark fins</i> | PRODUCTOS DEL MAR TICO Francisco Arguedas Tel: (506) 6657565 Fax: (506) 2592526 Puntarenas/San José <i>Dried shark fins</i> |

11.4 Chile

| |
|---|
| SALMONES ANTARTICA LTDA. Yuzo Yabuuchi Freire 007 Delcahue, Castro Tel: (56 65) 641279 Fax: (56 65) 641202 Chiloé, X Región <i>Shark</i> |
|---|

11.5 El Salvador

| | | |
|---|---|--|
| <p>CALEB DE QUEZADA 33 C.O. bis N° 924 Col. La Rábida Tel: (503) 2761928 Fax: (503) 2761928 San Salvador <i>Dried shark fin and cartilage.</i></p> | <p>CHARLES LOUIS PINTO Charles Louis Pinto Isla los Pinos Pasaje Las Colinas Km 11 Tel: (503) 2808460 Fax: (503) 2808460 San Salvador <i>Shark fin</i></p> | <p>FORMOSA Otto Tang P.O.Box 01-236 Tel: (503) 2789488 Fax: (503) 2789488 San Salvador <i>Shark, shark fin and shark skin</i></p> |
| <p>JOSE EFRAIN CHONG José Efraín Chong 33 Av. Sur N° 911 Col. Cucumacayan San Salvador <i>Shark fins, cartilage</i></p> | <p>MARTIN ALBERTO BELTRAN Martin Alberto Beltrán 8ª Av. N. N° 12 Tel: (503) 4412776 Santa Ana <i>Shark fins</i></p> | |

11.6 Guatemala

| | |
|---|---|
| <p>EXPORTADORES UNIDOS 7ª Ave, 16-25, Zona 9 Tel: (502 2) 315348 Guatemala <i>Shark, shark liver oil</i></p> | <p>PRODUCTOS VARIOS, S.A. (PROVAR) 7ª Av., 14-44, Zon. 9 La Galer. 2ª, Loc.N° 18, 2ª P Tel: (502 2) 312763 Guatemala <i>Frozen shark</i></p> |
|---|---|

11.7 Mexico

| | | |
|--|--|--|
| <p>ATLANTIDA DEL SUR S.A. DE C.V. Calle 59-A Pte.791 B Av. Jacinto Cancún Tel: (52 99) 450704 Mérida, Yucatán <i>Shark</i></p> | <p>BAROL Claudia Naves Bect Rafaela M. de Romero entre Potosí y Fronteras Tel: (52 62) 182045 Fax: (52 62) 183416 Hermosillo 83010, Sonora <i>Shark</i></p> | <p>FED. REG. DE SOC. COOP. DE LA IND. PES. DE B.C.F.C.L Bvld. Tte. Azuela S/N Zona Centro Tel: (52 617) 82718 Ensenada-B.C <i>Frozen shark</i></p> |
| <p>INTERNATIONAL EXCHANGE Ote. 107 N° 3235 2º piso Tel: (52 5) 5519218 Fax: (52 5) 7713703 Col. Bondonjito México D.F <i>Shark fins</i></p> | <p>JFSUS PARTIDA CANTU Central de Abastos B N° 60 Ej. del Moral Tel: (52 5) 6940140 Fax: (52 5) 6941301 México 09040, D.F <i>Shark</i></p> | <p>ULTRA COLD FOODS S.A. DE C.V. José Manuel Campillo Martínez Presa del Fuerte N° 7 Col. Rec. Hidr. Tel: (52 5) 8841788 Fax: (52 5) 8841949 Tultitlán Edo. de México <i>Frozen shark</i></p> |

11.8 Nicaragua

| | |
|---|---|
| <p>NICARAGUA TRADING S.A. Jorge Hueso Las Colinas Segunda Etapa N° 113 Tel: (505 2) 2760630 Fax: (505 2) 2674021 Managua <i>Shark fins</i></p> | <p>HONOR IMPORT EXPORT Arturo Sam Via Fernandez de Córdoba (507) 2619186 (507) 2618916 <i>Shark fins</i></p> |
|---|---|

11.9 Panama

OCEANIC EXPORT CORP.

Luis Prado
Pueblo Nuevo
Tel: (507) 2294034
Fax: (507) 2291064
Panama
Dried shark fins

11.10 Peru

CORPORACION DE PESCA S.A.

Esteban Tellez Mejia
Jr. Jorge Salazar 195
Tel: (51 1) 4715005
Fax: (51 1) 4753720
Lima 13
Frozen shark

I.B.C. CORPORACION DE NEGOCIOS S.A.

Enrique Garcia Abalde
Las Begonias 552 of. 21
Tel: (51 1) 4417588
Fax: (51 1) 4410880
Lima 27
Frozen shark

SOUTH PACIFIC TRADING CO. S.A.

Walter Valdez Leandro
Las Morenas 189 Urb. Camacho
Tel: (51 1) 4361595
Fax: (51 1) 4373568
Lima 12
Frozen shark, dried shark fins

11.11 Trinidad and Tobago

SEAFOOD ENTERPRISES LTD.

Anthony Byer
30 Mc Donald Street, Woodbrook
Tel: (809) 6277668
Fax: (809) 6244088
Port of Spain
Shark

TRI FISH ICE & COLD STORAGE LTD.

Bassart Mohammed
4 Paul Street
Tel: (809) 6684165
Fax: (809) 6683221
Sangre Grande
Shark

11.12 Uruguay

DAR LONG S.A.

Sr. Guey
Mercedes 946 Of. 302
Tel: (598 2) 981146
Fax: (598 2) 905007
Montevideo
Dried shark fins

11.13 Venezuela

FISHBEN C.A.

Calle 67-B Nº 91-11
Tel: (58 61) 73657
Fax: (58 61) 772887
Maracaibo, Edo. Zulia
Dried shark fins

VENCAT S.A.

Av. 4 de Mayo Resd. 4 de Mayo Local 4 PB
Tel: (58 95) 611186
Fax: (58 95) 635034
Porlamar, Nueva Esparta
Shark

APPENDIX IV.6
SHARKS IN THE MEDITERRANEAN
by MASSIMO SPAGNOLO

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1 STOCKS AND CATCHES

Throughout the world shark landings show a decreasing trend and therefore increasing attention is being paid to the state of these stocks. The phenomenon is hard to monitor since there is very little experience of specific shark fisheries in the world and no specific management regime has been introduced so far. Lack of qualitative information, heterogeneity in data collection and dissemination through different countries are only a few examples of the many aspects limiting the formulation of specific management plans for this fishery. In particular, there are difficulties related to the fact that sharks are part of the catch of several types of fishing gear such as trawling, longlining, purse seine, drift netting. The development of these techniques around the world, and particularly in the Mediterranean where stocks are heavily multi-specific, implies a continuous increase in the rate of exploitation of sharks.

An improvement in the quantity and quality of information concerning these species is required and the whole set of related statistics, most of them very poor and fragmented at present, need more extensive coverage. Official statistics are collected and reported in a number of ways and, occasionally, statistics of a particular country may differ when reported nationally and internationally. This is the case in France, where the national listing is wider than the one used by international bodies. In this case some of the information is lost. All kinds of shark statistics are usually grouped in only one or two categories. The lack of any distinction between species which are caught by gears used for pelagic fish and those species living in deep waters, representing the catch of trawlers or the bycatch of longliners, does not allow the framing of any specific management measures. In fact, not all species are endangered and many of those living in deep waters do not seem to be seriously affected by the increasing exploitation of the fishing industry. Given these circumstances, most of the information used for understanding the evolution of the phenomenon is primarily originated by researchers working on scientific programmes where shark catches are reported, even if they are not the target species of their work on board.

On the demand side it appears that the situation is the same. Consumption is difficult to monitor and, again, statistics on utilisation and trade in sharks have not been given the importance they deserve. Consequently, there is a lack of homogeneity and standardisation on data reporting for this group. Shark consumption has been growing fast in recent years and countries such as Italy, Spain and France are absorbing increasing quantities.

Sharks have a wide range of uses and the Mediterranean markets are the most important in absolute terms. Sharks are traded as raw material in the fish food market, fresh, chilled, frozen or dried- salted. In some cases it is sold as shark, sometimes it is used as a substitute for swordfish and other similar species. Shark liver is used as a raw material for the production of pharmaceutical products and the cartilage is used by the same industry for its curative properties. Skin is used for leather luxury goods and trade in shark fins is also important. Far Eastern markets and oriental restaurants attach great value to the latter. As a result, dried shark fins are one of the most expensive products in the world food market.

The number of shark species living in the Mediterranean is high and FAO has attempted to record landings of the most important. Unfortunately, the data collected is associated with the list of species reported in Table 1 which is not complete and some of the most important landings are not recorded.

Table 1 List of shark species reported in the FAO Yearbook

| English Name | Latin Name |
|-------------------------|--------------------------|
| Porbeagle | <i>Lamna nasus</i> |
| Catshark | <i>Scyliorhinus</i> spp. |
| Smooth-hound | <i>Mustelus</i> spp. |
| Picked dogfish | <i>Squalus acanthias</i> |
| Dogfish sharks nei | Squalidae |
| Angleshark | <i>Squatina squatina</i> |
| Angel Shark, Sand Devil | Squatimidae |
| Large Sharks | <i>Squaliformes</i> |
| Guitar Fish | <i>Rhinobatidae</i> |

Table 2 shows data concerning the landings in the Mediterranean of species reported in the FAO Yearbook.

Information recorded during a stock assessment campaign for demersal resources and other more specific research on board fishing vessels are much more detailed and report a higher number of species, some of them

being more important than those reported in official statistics. This is the case for the Italian statistics where it has been shown that Blue sharks (*Prionace glauca*) and Thresher sharks (*Alopias vulpinus*) are by far the most important species caught but they do not appear in national or international statistics.

The available data originating from scientific campaigns show that catches are highly variable, affected by:

- Large year-on-year fluctuations, which have been demonstrated by comparing data reported from investigations carried out in different years on vessels using identical gear.
- The type of gear used. Some gears are used to fish in deep waters. In the Mediterranean, the catch of sharks living in deep waters, by trawlers or longliners, seems to be rather marginal. Other gears are used for catching coastal resources and their impact on coastal sharks is more important. Depending on environmental and market conditions, small trawlers, seiners, drift nets, gillnets, trammel nets, etc are the most common gears used in the Mediterranean which have an impact on sharks.
- The seasonal performance of the fleets that have swordfish or *Thunnus alalunga* as their target species. When bad weather limits the fishing activity the bycatch is also reduced.

Table 2 Annual world and Mediterranean catches of selected species of sharks (tonnes)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|------------------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|
| World Total | 77 460 | 72 750 | 81 827 | 83 096 | 76 396 | 78 101 | 76 557 |
| Mediterranean | 9 016 | 10 751 | 11 409 | 8 782 | 15 036 | 9 837 | 7 026 |
| % Mediterranean | 11.64 | 14.78 | 14.03 | 10.56 | 19.68 | 12.59 | 9.17 |

Source: *FAO Yearbook*

According to official figures from FAO, Mediterranean countries contributed between 9 and 20% of annual world total landings of the selected species in the period 1990 to 1996. Of course, these figures report the official landings which do not include all those catches which are returned to the sea. Considering that in many cases sharks are a non-desirable bycatch and therefore are returned to the sea, much of it does not reach the market and is not reported.

In general, shark landings in the Mediterranean are a small percentage of the world total landed for each species. Of the two most important groups landed in the Mediterranean and recorded in the *FAO Yearbook* (*Mustelus* spp. and *Squalus acanthias*), only one represents a significant share of the world production. This is *Mustelus* spp., where Mediterranean landings amounted to as much as 67.7% in 1994 and the average percentage from 1990 to 1996 was 49.5%.

Table 3 Landings of the main species of sharks in the Mediterranean and the world (tonnes)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| <i>Mustelus spp.</i> | | | | | | | |
| Italy | 3 983 | 5 825 | 5 778 | 4 675 | 9 999 | 5 942 | 2 659 |
| Turkey | 1 715 | 2 292 | 2 404 | 1 436 | 2 880 | 1 783 | 2 158 |
| Tunisia | 956 | 113 | 427 | 187 | 142 | 128 | 100 |
| Greece | 148 | 206 | 227 | 267 | 377 | 360 | 353 |
| Syria | 33 | 29 | 39 | 40 | 39 | 39 | 50 |
| France | -- | 1 | 31 | -- | -- | -- | -- |
| Gaza Strip | -- | -- | -- | -- | -- | -- | 24 |
| Albania | -- | -- | -- | -- | -- | 20 | 12 |
| Total Area 37* | 6 835 | 8 466 | 8 906 | 6 605 | 13 437 | 8 252 | 5 356 |
| Total World | 16 720 | 14 265 | 20 525 | 18 235 | 19 859 | 15 784 | 11 442 |
| % | 40.9 | 59.3 | 43.4 | 36.2 | 67.7 | 52.3 | 46.8 |
| <i>Squalus acanthias</i> | | | | | | | |
| Bulgaria | 16 | 21 | 14 | 12 | 12 | 80 | 64 |
| Malta | 36 | 21 | 28 | 33 | 29 | 24 | 28 |
| France | 63 | 41 | 29 | 21 | 19 | -- | 7 |
| Ukraine | 1 330 | 775 | 595 | 409 | 148 | 67 | 44 |
| Romania | 45 | 26 | 53 | 6 | 3 | 7 | -- |
| Slovenia | -- | -- | 8 | 4 | 2 | 4 | -- |
| Total Area 37 | 1 490 | 884 | 727 | 485 | 213 | 182 | 143 |
| Total World | 35 826 | 32 559 | 30 002 | 25 749 | 22 026 | 22 787 | 19 362 |
| % | 4.2 | 2.7 | 2.4 | 1.9 | 0.8 | 0.8 | 0.7 |
| <i>Squalidae</i> | | | | | | | |
| Tunisia | -- | 856 | 1 183 | 860 | 677 | 596 | 640 |
| Croatia | -- | -- | 300 | 535 | 317 | 315 | 260 |
| Albania | -- | -- | -- | -- | -- | 1 | 64 |
| Yugoslavia | -- | -- | 5 | 2 | 3 | 7 | 10 |
| Yugoslavia SFR | 361 | 206 | -- | -- | -- | -- | -- |
| Malta | 5 | 15 | 5 | 7 | 10 | 5 | 4 |
| Total Area 37 | 366 | 1 077 | 1 493 | 1 404 | 1 007 | 924 | 978 |
| Total World | 20 179 | 20 566 | 24 136 | 31 464 | 27 638 | 31 709 | 36 655 |
| % | 1.8 | 5.2 | 6.2 | 4.5 | 3.6 | 2.9 | 2.7 |
| <i>Squatinae</i> | | | | | | | |
| Turkey | 34 | 17 | 13 | 13 | 15 | 31 | 42 |
| Malta | 1 | -- | -- | -- | -- | -- | -- |
| Albania | -- | -- | -- | -- | -- | -- | 54 |
| Total Area 37 | 35 | 17 | 13 | 13 | 15 | 31 | 96 |
| Total World | 233 | 156 | 127 | 244 | 269 | 500 | 649 |
| % | 15.0 | 10.9 | 10.2 | 5.3 | 5.6 | 6.2 | 14.8 |
| <i>Squaliformes</i> | | | | | | | |
| Greece | 171 | 206 | 170 | 124 | 205 | 266 | 285 |
| Total Area 37 | 171 | 206 | 170 | 124 | 205 | 266 | 285 |
| Total World | 1 994 | 2 790 | 3 744 | 4 634 | 3 913 | 3 826 | 5 391 |
| % | 8.6 | 7.4 | 4.5 | 2.7 | 5.2 | 7.0 | 5.3 |

* Area 37 is the Mediterranean and the Black Sea

Source: FAO Yearbook

Landings of *Squalus acanthias* show a dramatic decrease from 1 490 tonnes in 1990 to the more recent 143 tonnes in 1996. The reduction is due to the changes in the Ukrainian fleet whose catch of this species fell by 97% during this period. The official figures show Mediterranean landings as being fairly stable over time but fluctuations in landings do occur. They are partly related to stock overexploitation, but the overall performance of the fleets in a given fishing season also plays an important role. Italy shows the largest shark landings even if the trend is steeply downward since 1994. This can be partly explained by the poor seasons that longliners have had in recent years and partly by the state of the stocks. Although absolute figures show that Mediterranean landings are fairly minor in the world wide context, the progressive reduction of the size of the unit landed, as

fishermen report, calls for a conservative approach to the problem, which, in any case, requires more stringent policies in countries where stocks are already considered by scientists to be overexploited.

Table 4 Annual catches of selected species of sharks in the Mediterranean (tonnes)

| Country | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|----------------|-------|--------|--------|-------|--------|-------|-------|
| Italy | 3 983 | 5 825 | 5 778 | 4 675 | 9 999 | 5 942 | 2 659 |
| Turkey | 1 749 | 2 309 | 2 417 | 1 449 | 2 895 | 1 814 | 2 200 |
| Tunisia | 1 059 | 1 066 | 1 707 | 1 178 | 861 | 807 | 794 |
| Greece | 335 | 416 | 400 | 411 | 699 | 705 | 750 |
| Croatia | — | — | 300 | 535 | 317 | 315 | 260 |
| Albania | — | — | — | — | — | 21 | 131 |
| Bulgaria | 16 | 21 | 14 | 12 | 12 | 80 | 64 |
| Syria | 33 | 29 | 39 | 40 | 39 | 39 | 50 |
| Ukraine | 1 330 | 775 | 595 | 409 | 148 | 67 | 44 |
| Malta | 42 | 36 | 33 | 40 | 39 | 29 | 33 |
| Gaza Strip | — | — | — | — | — | — | 24 |
| Yugoslavia | — | — | 5 | 2 | 3 | 7 | 10 |
| France | 63 | 42 | 60 | 21 | 19 | — | 7 |
| Yugoslavia SFR | 361 | 206 | — | — | — | — | — |
| Slovenia | — | — | 8 | 4 | 2 | 4 | — |
| Romania | 45 | 26 | 53 | 6 | 3 | 7 | — |
| Total | 9 016 | 10 751 | 11 409 | 8 782 | 15 036 | 9 837 | 7 026 |

Source: FAO Yearbook

The figures presented in Table 4 require further consideration and analysis suggests the data needs to be amended. In fact:

- The fleet structure operating in Mediterranean is fairly homogeneous and in most countries trawling is the most utilised gear (see Table 5). Given that sharks are not a target species, the catch rate is expected to be casual and therefore homogeneous over time for the same gear in each country. Apparently, there are some important fishing nations which do report important landings of sharks as a bycatch of trawling or longlining and drift-netting, while others, such as Spain, seem not to land any shark at all in the area or only to record small quantities, as with France. Italy frequently reports large quantities of *Mustelus* spp. as a result of the trawling fleet activity, while France reports only a small quantity of *Squalus acanthias*.
- Data reported by scientific research shows that some of the most frequent species that are caught as bycatch are not even listed in the official statistics. In particular, this is the case for *Prionace glauca*, whose landings are understood to be high as a bycatch of drift nets used for catching swordfish in April/May and *Thunnus alalunga* in September/November.

Table 5 Fleet structure in the Mediterranean - numbers of boats involved 1997

| Country | Small scale fisheries | Trawling | Purse seiners | Tuna purse seiner | Other gears |
|----------|-----------------------|----------|---------------|-------------------|-------------|
| Albania | 17 | 72 | 21 | 0 | 0 |
| Algeria | 780 | 280 | 690 | 0 | 0 |
| Cyprus | 527 | 15 | 0 | 0 | 0 |
| Croatia | 5 000 | 767 | 276 | 0 | 0 |
| Egypt | 2 562 | 1 355 | 135 | 0 | 0 |
| France | 2 000 | 165 | 26 | 34 | |
| Greece | 20 860 | 410 | 400 | 0 | 0 |
| Israel | 400 | 30 | 26 | 0 | 0 |
| Italy | 11 753 | 3 400 | 380 | 0 | 457 |
| Lebanon | 1 000 | 0 | 0 | 0 | 0 |
| Libya | 3 340 | 91 | 130 | 0 | 0 |
| Malta | 1 600 | 9 | 0 | 0 | 0 |
| Morocco | 2 000 | 56 | 0 | 0 | 360 |
| Syria | 1 470 | 20 | 0 | 0 | 0 |
| Slovenia | 95 | 0 | 0 | 0 | 14 |
| Spain | 3 648 | 1 234 | 454 | 0 | 0 |
| Tunisia | 13 680 | 458 | 319 | 65 | 0 |
| Turkey | 1 045 | 134 | 28 | 0 | 0 |
| Total | 71 777 | 8 496 | 2 885 | 99 | 831 |

Source: FAO Circulaire n. 927

2 LANDINGS BY TYPE OF FISHING GEAR

Mediterranean fisheries are multi-species and multi-gear, meaning that all species can be caught by all gears, all of them in competition for the catch of the same species. The only exception is the clam fishery. Sharks are caught mainly as a bycatch of drift-netting, longlining and, as a target species, by recreational fisheries. In the case of trawlers, knowing the strong multi-specificity of Mediterranean stocks, shark landings cannot be considered as bycatch since they are part of the bundle of fish caught by this gear. The largest landings of different sharks are associated with trawling, which is practised throughout the year except for the withdrawal periods which take place in some countries. The most important groups caught by trawlers are *Mustelus* spp. and *Dasyatis pastinaca*. Official statistics only report the first group systematically while the second is not recorded at all. There is a large body of scientific research on the impact of trawlers on Mediterranean species. Some of these results can be used in order to estimate the dimension of the phenomenon and list the shark species involved.

Depth is the main element allowing the identification of different species in the case of trawling. A specific research project on stock assessment for demersal resources in the southern Mediterranean (Andaloro, 1991) shows how the presence of sharks is dependent on different depths. 95% of the catch occurs within the first 200 meters and the most common species, *Dasyatis pastinaca* and *Mustelus mustelus*, have been caught at between 0 and 100 meters. *Mustelus punctulatus* and *Pteromylopus bavinus* have been found at the same depth, but their abundance has been estimated as marginal. Other species (*Etmopterus spinax*, *Galeus melastomus*, *Scyliorhinus canicula* and *Scyliorhinus stellaris*) have been found at between 200 and 700 meters. The average weight of the sharks found during this operation was 374g.

Another piece of research, which was carried out for red shrimp stock assessment (Di Natale et al. 1995), found identical results for the species found at around 400 meter depth. The large species, *Hexanchus griseus*, occurred in the northern Mediterranean (Ligurian and upper Tyrrhenian) but not in the southern Mediterranean where the latter research took place. The average weight of the sharks found during this operation was 10.2 kg but, by excluding the largest specimen, the average becomes as low as 590g.

Different results emerge in the case of drift netting and large longlining fisheries. In these cases fishermen have target species like tuna and swordfish. Sharks can be considered as a bycatch which, in the case of drift nets, is quite low even if large quantities of *Cetorhinus maximus* are caught occasionally.

The impact of longliners is more evident and some species are caught frequently during the fishing season. *Prionace glauca*, *Alopias vulpinus* and *Lamna nasus* have been observed with the highest frequency. All elasmobranchs taken together represent 3.8% of longline total landings. The size of *Prionace glauca* is reported to be decreasing and the average weight has been found to be 3.4 kg. This species is reported to be the most important share of all the bycatch of longliners. In this respect, some research carried out in the lower Adriatic (Marano et al. 1988) reported that *Prionace glauca* landings account for 74.4% by weight and 61.2% of units of the total bycatch.

Some conclusions can be drawn from this analysis. The whole Mediterranean area has no specific fishery targeting sharks. All shark landings consist of those caught by trawlers or the bycatch of longliners and drift nets, each of them having a different catch rate of sharks.

Shark landings as bycatch taken by drift nets are negligible in the Mediterranean. In any case, following the recent Fisheries Council meeting of the European Union ministers of 8 June 1998, it has been decided that the drift net fishery has to be closed down by 1 January 2002 to EU fishermen. This was the first time a decision to ban a fishing technique has been taken within the framework of the Common Fisheries Policy. The measure is intended to act as a conservation device for tuna fisheries in the Atlantic and the Mediterranean. This gear is not a cause of major concern within a possible shark conservation policy. Nevertheless, it should be noted that non-EU member countries show an increasing interest in this fishery and new vessels will soon be operating in the Mediterranean. The size of the vessel is not a significant parameter in evaluating the impact on bycatch as the net length is the true variable influencing catch rates.

Shark landings as bycatch taken by longliners show a significant catch rate and in some cases the size of the specimens landed show a sharp decrease. The drift net ban will affect this gear since fisher re-conversion programmes will tend naturally to shift to it. It is foreseeable that this will have a major impact on sharks in future. As in the previous case, the size of the vessel is not a significant parameter in evaluating the impact on bycatch. It is the number and dimension of the hooks which influence the catch rate. Moreover, large and small vessels carrying this gear are widespread all over the Mediterranean, which makes difficult to predict the global impact on species like sharks.

Shark landings by trawlers have different implications depending on the season, dimension of the vessel, the depth at which fishing operations take place, target species etc. Reports from scientific research on the importance of sharks in trawler fisheries show that a high number of sharks is caught in different proportions. At this stage, it does not seem to be possible to say a final word on the issue. More information is needed and, as a recommendation to management bodies, the on-going stock assessment campaign should include a specific section to analyse and monitor the evolution of this fishery.

3 TRADE

Shark trade is not a major item within the trade flows of the whole European Union but is largely concentrated among Mediterranean countries. Italy, Spain and France account for more than 70% of sharks traded in the European Union. Italy is by far the largest consumer country with imports of 14 420 tonnes and exports of well under 300 tonnes. According to the official statistics, Spain and France play an important role in Mediterranean shark trade but their catch from this area is totally marginal and, apparently, their fleets do not participate in the exploitation of these species.

Table 6 European Union imports and exports of shark in 1997

| | IMPORTS | | | EXPORTS | | |
|-----------------|---------------|---------------|-------------|---------------|---------------|-------------|
| | Tonnes | ECUx1000 | ECU/Kg | Tonnes | ECUx1000 | ECU/Kg |
| Italy | 14 389 | 35 189 | 2.44 | 284 | 693 | 2.44 |
| France | 7 323 | 15 550 | 2.12 | 1 564 | 5 472 | 3.50 |
| Spain | 7 218 | 10 058 | 1.39 | 12 390 | 24 183 | 1.95 |
| UK | 2 822 | 5 635 | 2.00 | 1 424 | 3 191 | 2.24 |
| Germany | 2 210 | 5 436 | 2.46 | 1 373 | 3 634 | 2.47 |
| Netherlands | 1 961 | 7 125 | 3.63 | 1 069 | 4 546 | 4.23 |
| Denmark | 1 482 | 2 297 | 1.55 | 888 | 3 960 | 4.46 |
| Greece | 1 100 | 1 593 | 1.45 | 18 | 57 | 3.17 |
| Belgium | 662 | 1 635 | 2.47 | 124 | 287 | 2.32 |
| Portugal | 652 | 994 | 1.53 | 1 758 | 2 458 | 1.40 |
| Sweden | 108 | 318 | 2.94 | 179 | 385 | 2.15 |
| Austria | 40 | 206 | 5.15 | 0 | 0 | - |
| Finland | 6 | 19 | 3.17 | 0 | 0 | - |
| Ireland | 1 | 4 | 4.00 | 330 | 295 | 0.89 |
| Total EU | 39 983 | 86 059 | 2.15 | 21 401 | 49 161 | 2.23 |

Source: Eurostat

Data used in this study requires some further explanation since Eurostat statistics on trade include trade with partners external to the EU as well as trade among EU countries. Therefore, total imports, or exports, refer to the sum of all imports/exports from EU and non EU countries. The data reported therefore contains a proportion of double counting and the amount double counted is the quantity imported by one EU countries and re-exported to another EU country. Therefore, in the Eurostat trade statistics, imports from outside the EU can be considered as net imports to EU although there may be marginal quantities re-exported to non EU countries. However, figures referring to internal exchange probably contain some double counting. Imports of sharks from the United States represent an important share of the total imports to the EU. The total trade flow from US (8 577 tonnes) accounts for about 41% of the total imports from non EU countries (21 051 tonnes) and it is by far the largest sharks exporter country to this area.

Table 7 European Union imports of shark from non-EU Mediterranean countries in 1997

| Importer ^a | France | | Italy | | Greece | | Portugal | | Spain | | Total | |
|-----------------------|--------|-------|-------|-------|--------|-------|----------|-------|-------|-------|-------|-------|
| | Tonnes | Value | Tonne | Value | Tonne | Value | Tonne | Value | Tonne | Value | Tonne | Value |
| Turkey | 0 | 0 | 12 | 41 | 16 | 30 | 0 | 0 | 0 | 0 | 28 | 71 |
| Morocco | - | 3 | 31 | 50 | 0 | 0 | 19 | 80 | 212 | 368 | 262 | 501 |
| Algeria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 4 |
| Total | - | 3 | 43 | 91 | 16 | 30 | 19 | 80 | 216 | 372 | 294 | 576 |

Source Eurostat

Value= ECU 1 000

As has been shown earlier, other Mediterranean countries also report some shark landings but they do not seem to be active in the shark trade. Available data show that only Morocco, Turkey and Algeria have some marginal trade with other Mediterranean countries. Moroccan production exported to Spain must be caught in Atlantic waters since no landings are officially reported in their Mediterranean harbours. Turkish exports to Italy and Greece are a marginal share of their production which was about 2 200 tonnes in 1996.

EU exports of sharks to non-EU Mediterranean countries is marginal, the only exception being the export of 265 tonnes from Spain to Algeria in 1997. It could be that trade flows are not officially reported but it is more likely that the figures in Tables 7 and 8 reflect the lack of any tradition of shark consumption in these countries.

Table 8 European Union exports of shark to non-EU Mediterranean countries in 1997

| Exporter ^a | Italy | | UK | | Spain | | Total | |
|-----------------------|--------|----------|--------|----------|--------|----------|--------|----------|
| | Tonnes | ECUx1000 | Tonnes | ECUx1000 | Tonnes | ECUx1000 | Tonnes | ECUx1000 |
| Slovenia | 6 | 17 | 0 | 0 | 0 | 0 | 8 | 17 |
| Croatia | 1 | 2 | 1 | 3 | 0 | 0 | 2 | 5 |
| Algeria | 0 | 0 | 0 | 0 | 263 | 257 | 263 | 257 |
| Total | 7 | 19 | 1 | 3 | 263 | 257 | 273 | 279 |

Source: Eurostat

3.1 Shark trade in Italy

Italy is the largest importer of sharks in the Mediterranean and in the EU. Production and imports have been rising sharply in recent years. In the middle of the 1980s imports amounted to 6-7 000 tonnes per year and reported production was around 1 000 tonnes. The most recent figures (1997) show total imports of 14 420 tonnes, while only 287 tonnes were exported. As has been mentioned earlier, shark landings are subject to large fluctuations so, even if recent years showed a decrease from about 10 000 tonnes in 1994 to 2 659 tonnes in 1996, this is not necessarily a continuing trend. Taking the average annual landings over time to be about 5 000 tonnes, the total consumption of sharks in Italy can be estimated to be as high as 20 000 tonnes, which accounts for 2.5% of total Italian fish consumption (1.6% if aquaculture production is included).

Imports flow to Italy from 31 countries and Italian exports are absorbed by 12 countries. Over 70% of imported sharks are from four countries: Spain, Netherlands, France and Germany. Imports from EU countries account for over 80% and Italy is the most important market in the European Union. The largest quantities of sharks (Picked Dog fish and Smooth hound) are imported frozen from Spain, while France, Netherlands and Denmark export major quantities of fresh product.

According to ISTAT figures, total imports in 1996 amounted to 14 894 tonnes for a total value of US\$36 185 600. (US\$1=Lit1 780). Official statistics include two shark groups: Picked dogfish (*Squalus acanthias*) and Smooth hound (*Mustelus mustelus*) and "Other sharks". The two groups are recorded either as fresh-chilled or frozen. Frozen picked dogfish and Smooth-hound are the most important group imported to Italy (78.2% in quantity and 64.9% in value). The average price is about US\$4.80/kg for the fresh product, whatever the group, while it is about US\$1.9/kg for the frozen product. Small quantities of fillets (268 tonnes in 1996) are also imported and their price was US\$3.6/kg for fresh and US\$3.3/kg for frozen.

Table 9 Italian imports and exports of shark in 1997

| Country | Imports | | | Exports | | |
|-------------------|---------|----------|--------|---------|----------|--------|
| | Tonnes | ECUx1000 | ECU/kg | Tonnes | ECUx1000 | ECU/kg |
| Spain | 6 595 | 9 170 | 1.39 | 102 | 225 | 2.21 |
| Netherlands | 1 219 | 5 715 | 4.69 | 2 | 7 | 3.50 |
| France | 1 183 | 5 456 | 4.61 | 17 | 79 | 4.65 |
| Germany | 1 123 | 3 550 | 3.16 | 0 | 0 | - |
| Portugal | 615 | 820 | 1.33 | 0 | 0 | - |
| UK | 472 | 1 626 | 3.45 | - | 3 | - |
| Denmark | 359 | 2 176 | 6.06 | - | 1 | - |
| Belgium | 17 | 51 | 3.00 | 28 | 54 | 1.93 |
| Austria | 0 | 0 | - | - | 8 | - |
| Greece | 4 | 15 | 3.75 | 109 | 197 | 1.81 |
| Sweden | 4 | 23 | 5.75 | 0 | 0 | - |
| Morocco | 31 | 50 | 1.61 | 0 | 0 | - |
| Turkey | 12 | 41 | 3.42 | 0 | 0 | - |
| Slovenia | 0 | 0 | - | 6 | 17 | 2.83 |
| Hungary | 0 | 0 | - | 1 | 2 | 2.00 |
| Croatia | 0 | 0 | - | 1 | 2 | 2.00 |
| Mauritania | 72 | 114 | 1.58 | 0 | 0 | - |
| Senegal | 50 | 88 | 1.76 | 0 | 0 | - |
| Guinea | 3 | 6 | 2.00 | 0 | 0 | - |
| Ghana | 1 | 1 | 1.00 | 0 | 0 | - |
| Angola | 2 | 2 | 1.00 | 0 | 0 | - |
| Somalia | 4 | 6 | 1.50 | 0 | 0 | - |
| Mauritius | 121 | 495 | 4.09 | 0 | 0 | - |
| South Africa | 601 | 1 631 | 2.71 | 0 | 0 | - |
| United States | 262 | 733 | 2.98 | 0 | 0 | - |
| Canada | 22 | 72 | 3.27 | 0 | 0 | - |
| Honduras | 1 | 2 | 2.00 | 0 | 0 | - |
| Ecuador | 171 | 221 | 1.29 | 0 | 0 | - |
| Peru | 41 | 43 | 1.05 | 0 | 0 | - |
| Chile | 2 | 4 | 2.00 | 0 | 0 | - |
| Argentina | 438 | 827 | 1.89 | 0 | 0 | - |
| Singapore | 788 | 1 774 | 2.25 | 0 | 0 | - |
| Republic of Korea | 31 | 99 | 3.19 | 0 | 0 | - |
| Japan | 154 | 377 | 2.45 | 22 | 95 | 4.32 |
| Intra - EU | 11 591 | 28 603 | 2.47 | 254 | 576 | 2.27 |
| Extra EU | 2 807 | 6 586 | 2.35 | 30 | 117 | 3.90 |
| Total world | 14 398 | 35 189 | 2.44 | 284 | 693 | 2.44 |

Source: Eurostat

Fresh produce sold at auction markets command a much higher price. According to a TRAFFIC Report, smooth-hound and picked dogfish average prices in Rome were as high as US\$8.8/kg in 1996, which is by far the highest value attributed along the Mediterranean coast. Production in southern regions commands much lower prices, 30% less, as the marketing channel is much longer and the species is not appreciated locally. Indeed, consumption is highly diversified depending on the area where it takes place. The north and north-eastern regions show a higher consumption rate and auction markets usually have these species sold on their premises.

3.2 Shark Trade in Spain

Official statistics do not report any shark catch in the Mediterranean regions of Spain but unofficial sources come to different conclusions. TRAFFIC experts (Del Cerro, Guzman and Quintanilla) estimate Spanish Mediterranean production of shark averaged 6 000 tonnes per annum from 1985-1991. In 1985 landings were estimated at 5 587 tonnes and in 1991 they were 6 879 tonnes. Shark production, as in any other Mediterranean country, is landed as a bycatch of trawling and longline fisheries.

The species landed are not reportedly significantly different from other Mediterranean countries. The report of the study group on Elasmobranchs (ICES CM 1989) estimated the annual Atlantic production to be as high as 20 000 tonnes in the second half of the 1980s with an average in the period 1978-1994 of about 10 000 tonnes. Production fluctuates considerably but landings are decreasing over time. Demand is consistent among Spanish consumers and a TRAFFIC report confirms that Spanish consumers in the Mediterranean area appreciate shark meat greatly, whatever its presentation. Fresh, frozen, steaks and fillets are consumed everywhere, even if prices for fresh products are higher and variable depending on the species considered. Shortfin Mako is the most valuable shark meat in the Mediterranean (US\$5.3/kg) and its price can be compared to that for swordfish. Smooth Hound and Picked Dogfish also command relatively high prices (US\$4.9/kg). As in most other countries, shark production depends on seasonal variations in vessels targeting other species so shark meat prices are very variable according to the state of the fish markets, the quantities landed, species etc.

Spain imports shark from 39 countries and exports, or re-exports, to 22. Total imports amount to 7 223 tonnes, 43.8% of this originates from other EU countries. The product imported is usually frozen and the average price is ECU1.39/kg, less than the average export price which is as high as ECU1.95/kg. Italy is the major importing country, taking 47% of the quantity and 32% by value of Spanish exports of sharks.

Table 10 Spanish imports and exports of shark in 1997

| Country | Imports | | | Exports | | |
|----------------------|---------|----------|--------|---------|----------|--------|
| | Tonnes | ECUx1000 | ECU/kg | Tonnes | ECUx1000 | ECU/kg |
| France | 84 | 173 | 2.06 | 15 | 41 | 2.73 |
| Belgium | 2 | 4 | 2.00 | 0 | 0 | - |
| Netherlands | 0 | 0 | - | 37 | 110 | 2.97 |
| Germany | - | 14 | - | 184 | 426 | 2.32 |
| Italy | 134 | 289 | 2.16 | 5 816 | 7 724 | 1.33 |
| UK | 1 560 | 2 979 | 1.91 | 130 | 146 | 1.12 |
| Ireland | 21 | 45 | 2.14 | 0 | 0 | - |
| Denmark | 0 | 0 | - | 0 | 0 | - |
| Greece | 0 | 0 | - | 193 | 257 | 1.33 |
| Portugal | 1 365 | 1 478 | 1.08 | 443 | 673 | 1.52 |
| Ceuta and Melilla | 0 | 0 | - | 14 | 12 | 0.86 |
| Faeroe Islands | 11 | 14 | 1.27 | 0 | 0 | - |
| Morocco | 212 | 368 | 1.74 | 0 | 0 | - |
| Gibraltar | - | - | - | - | 3 | - |
| Seychelles | 0 | 0 | - | 910 | 1 063 | 1.17 |
| Mauritius | 0 | 0 | - | 1 396 | 1 168 | 0.84 |
| Madagascar | 0 | 0 | - | 575 | 494 | 0.86 |
| Algeria | 4 | 4 | 1.00 | 263 | 259 | 0.99 |
| Mauritania | 251 | 382 | 1.52 | 0 | 0 | - |
| Cape Verde | 21 | 22 | 1.05 | 0 | 0 | - |
| Senegal | 58 | 117 | 2.02 | 0 | 0 | - |
| Gambia | 4 | 4 | 1.00 | 0 | 0 | - |
| Guinea Bissau | 216 | 346 | 1.60 | 0 | 0 | - |
| Guinea | 84 | 88 | 1.05 | 0 | 0 | - |
| Sierra Leone | 37 | 43 | 1.16 | 0 | 0 | - |
| Ivory Coast | 29 | 45 | 1.55 | 0 | 0 | - |
| Ghana | 45 | 71 | 1.58 | 0 | 0 | - |
| Sao Tome | 273 | 288 | 1.05 | 0 | 0 | - |
| Gabon | 15 | 15 | 1.00 | 0 | 0 | - |
| Kenya | 1 | 2 | 2.00 | 0 | 0 | - |
| Angola | 39 | 49 | 1.26 | 0 | 0 | - |
| Mauritius | 2 | 5 | 2.50 | 0 | 0 | - |
| South Africa | 28 | 43 | 1.54 | 0 | 0 | - |
| Belize | 268 | 458 | 1.71 | 0 | 0 | - |
| Honduras | 504 | 542 | 1.08 | 0 | 0 | - |
| Panama | 648 | 575 | 0.89 | 0 | 0 | - |
| Cuba | 230 | 179 | 0.78 | 132 | 276 | 2.09 |
| Ecuador | 18 | 35 | 1.94 | 0 | 0 | - |
| Peru | 246 | 491 | 2.00 | 0 | 0 | - |
| Brazil | 14 | 52 | 3.71 | 39 | 24 | 0.62 |
| Chile | 21 | 28 | 1.33 | 0 | 0 | - |
| Uruguay | 9 | 10 | 1.11 | 989 | 946 | 0.96 |
| Argentina | 28 | 54 | 1.93 | 0 | 0 | - |
| United Arab Emirates | 0 | 0 | - | 47 | 435 | 9.26 |
| Thailand | 0 | 0 | - | 24 | 63 | 2.63 |
| Singapore | 0 | 0 | - | 2 | 13 | 6.50 |
| China | 303 | 312 | 1.03 | 192 | 1 716 | 8.94 |
| Republic of Korea | 56 | 60 | 1.07 | 93 | 101 | 1.09 |
| Japan | 236 | 244 | 1.03 | 256 | 2 539 | 9.92 |
| Hong Kong | 0 | 0 | - | 633 | 5 681 | 8.97 |
| Taiwan PC | 141 | 127 | 0.90 | 0 | 0 | - |
| Not determined | 0 | 0 | - | 3 | 16 | 5.33 |
| Intra EU | 3 166 | 4 982 | 1.57 | 6 822 | 9 387 | 1.38 |
| Extra EU | 4 052 | 5 076 | 1.25 | 5 568 | 14 796 | 2.66 |
| Total world | 7 218 | 10 058 | 1.39 | 12 390 | 24 183 | 1.95 |

Source: Eurostat

3.3 Shark trade in France

France's market for sharks is one of the most important in Europe. Shark consumption is widespread all over the country and consumers appreciate this product very much this product. It is sold in various guises. "Saumonette", the commercial name used for skinless meat of small spotted eatshark, nursehound, and Squalidae in general, is associated with the consumption of salmon and is by far the commonest method of consuming shark in France. It has been estimated that French consumption of "saumonette" at home accounts for 6 500 tonnes (Roussette and saumonette, Linearires, 1996).

The quantity of sharks landed by the French fleet has always been important. FAO statistics in the 1980s report about 35 000 tonnes of shark caught annually but in the following years the figure dropped down to about 20 000 tonnes. In 1997 imports reached 7 300 tonnes and they are becoming increasingly important as internal production is declining and exports, in particular to Italy, reduce the amount of shark for domestic consumption. The large amount of fresh sharks landed by the French fleet gives a competitive edge to this product. As such, fresh or chilled sharks are sold to the Italian market at US\$6/kg and this price is usually higher than the prices set on the French market. Spanish traders also started to buy sharks in France recently.

The Mediterranean production is almost negligible and has never been important. Official statistics from FAO report landings of 63 tonnes in 1990 and 7 tonnes in 1997, almost all of them concerning Picked Dog fish. The IUCN/Shark Specialist Group reports that, even if detailed information is lacking, some evidence exists that a shark fishery off the Mediterranean western area is more important than has been officially reported.

France imports sharks from 21 countries and exports to 7 countries only. Total exports are also declining since the internal market is becoming more attractive to traders. The structure of imports makes the French market different from other European and Mediterranean countries. The United States is the largest exporter to France, accounting for 71% of the value of imports and about 38% of the total quantity. Italy is the largest importer from France and its share is about 84% of the total with 1 305 tonnes out of a total of 1 552 tonnes. It should be noted that the average import price is ECU1.08/kg, while the average export price is ECU3.51/kg. As already reported, the difference can be explained by the fact that imports are mainly frozen while exports are fresh or chilled.

Table II French imports and exports of shark in 1997

| Country | Imports | | | Exports | | |
|---------------|---------|----------|--------|---------|----------|--------|
| | Tonnes | ECUx1000 | ECU/kg | Tonnes | ECUx1000 | ECU/kg |
| Spain | 61 | 117 | 1.92 | 60 | 171 | 2.85 |
| Netherlands | 3 | 61 | 20.33 | 12 | 48 | 4.00 |
| Germany | 3 | 11 | 3.67 | 17 | 63 | 3.71 |
| Portugal | 21 | 33 | 1.57 | 29 | 32 | 1.10 |
| UK | 993 | 2 943 | 2.96 | 4 | 22 | 5.50 |
| Denmark | 114 | 369 | 3.24 | 0 | 0 | - |
| Belgium | 48 | 121 | 2.52 | 133 | 298 | 2.24 |
| Italy | 43 | 93 | 2.16 | 1 306 | 4 830 | 3.70 |
| Sweden | 5 | 15 | 3.00 | 0 | 0 | - |
| Norway | 24 | 11 | 0.46 | 3 | 9 | 3.00 |
| Morocco | - | 3 | - | 0 | 0 | - |
| Ivory Coast | 3 | 10 | 3.33 | 0 | 0 | - |
| Congo | - | 1 | - | 0 | 0 | - |
| Scngal | 4 | 9 | 2.25 | 0 | 0 | - |
| United States | 5 526 | 11 154 | 2.02 | 0 | 0 | - |
| Canada | 151 | 185 | 1.23 | 0 | 0 | - |
| Trinidad | 6 | 6 | 1.00 | 0 | 0 | - |
| Panama | 6 | 13 | 2.17 | 0 | 0 | - |
| Ecuador | 13 | 23 | 1.77 | 0 | 0 | - |
| Venezuela | 50 | 36 | 0.72 | 0 | 0 | - |
| Oman | 55 | 120 | 2.18 | 0 | 0 | - |
| Vietnam | 1 | 1 | 1.00 | 0 | 0 | - |
| Taiwan PC | 17 | 19 | 1.12 | 0 | 0 | - |
| New Zealand | 18 | 23 | 1.28 | 0 | 0 | - |
| Intra-EU | 1 448 | 3 93 | 2.72 | 1 561 | 5 463 | 3.50 |
| Extra EU | 5 875 | 11 617 | 1.98 | 3 | 9 | 3.00 |
| Total world | 7 323 | 15 550 | 2.12 | 1 564 | 5 472 | 3.50 |

Source: Eurostat

The pharmaceutical and cosmetic industries, as well as the health food sector are all involved in the processing of products containing sharkskin, liver oil, squalene or cartilage as a raw material. Among Mediterranean countries, France is the only one with a tradition in the use of squalene and liver oil for the production of cosmetics, perfumes and pharmaceutical products. Shark skin is also used in the manufacturing of handbags, wallets and other luxury items, while an attempt to produce shark cartilage capsules has been reported (Todisco, 1996) and shark fins have been found in some oriental restaurants and specialist food shops.

3.4 Shark trade in Greece

Greece participates in the shark trade, although this product has the lowest ranking in the grading of fish products among Greek consumers. Nevertheless, Greece imports more than 1 000 tonnes of sharks annually and its share is increasing over time. Production is reported to be around 750 tonnes in 1996, while it was about 335 tonnes in 1990. The figures on production and import show that interest in shark consumption is continuously and steeply increasing. Wholesale prices for dogfish are reported to be rather low compared to other Mediterranean markets. In the Athens wholesale market, the nominal prices show a continuous decrease from US\$2.3/kg in 1990 to US\$1.3/kg in 1994 (TRAFFIC Report), while a fresh dogfish steak in an Athens supermarket was priced US\$8.75/kg in May 1996. Imports play a substantial role in Greek consumption and 17 countries export various shark species to Greece. Considering that the average price of imports is ECU1.44/kg, it can be concluded that most of the imports are frozen and the national fishing fleet provides for the market for fresh shark meat.

Table 12 Greek imports and exports of shark in 1997

| Country | Imports | | | Exports | | |
|----------------------|---------|----------|--------|---------|----------|--------|
| | Tonnes | ECUx1000 | ECU/kg | Tonnes | ECUx1000 | ECU/kg |
| France | 12 | 23 | 1.92 | 0 | 0 | - |
| Netherlands | 21 | 35 | 1.67 | 0 | 0 | - |
| Italy | 163 | 289 | 1.77 | 17 | 52 | 3.06 |
| Portugal | 47 | 45 | 0.96 | 0 | 0 | - |
| Spain | 142 | 169 | 1.19 | 1 | 5 | 5.00 |
| Turkey | 16 | 30 | 1.88 | 0 | 0 | - |
| Mauritania | 3 | 5 | 1.67 | 0 | 0 | - |
| Senegal | 24 | 24 | 1.00 | 0 | 0 | - |
| Guinea | 3 | 6 | 2.00 | 0 | 0 | - |
| Sierra Leone | 5 | 9 | 1.80 | 0 | 0 | - |
| Somalia | 2 | 2 | 1.00 | 0 | 0 | - |
| United States | 229 | 306 | 1.34 | 0 | 0 | - |
| Argentina | 178 | 275 | 1.55 | 0 | 0 | - |
| United Arab Emirates | 8 | 9 | 1.13 | 0 | 0 | - |
| Oman | 67 | 70 | 1.05 | 0 | 0 | - |
| Singapore | 180 | 295 | 1.64 | 0 | 0 | - |
| Intra EU | 385 | 560 | 1.46 | 17 | 58 | 3.06 |
| Extra EU | 715 | 1 033 | 1.45 | 0 | 0 | - |
| Total world | 1 100 | 1 594 | 1.45 | 17 | 58 | 3.06 |

Source: Eurostat

APPENDIX IV.7

IMPROVEMENT OF DRIED SHARK TRADE BETWEEN BRUFUT IN THE GAMBIA AND MANKESSIM IN GHANA

by O. ABOBARIN, O. K. L. DRAMMIEH and M. NJIE

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1 INTRODUCTION

This report was prepared as part of a study effort on marketing artisanal fish products in West Africa in the framework of the West Africa Regional programme "Improvement of Post-harvest Utilization of Artisanal Fish Catches" – WARF, financed by the Commission of the EU.

There is a thriving trade in dried shark products between the Gambia and Ghana but between 1993 and 1995 this declined. 1996 is likely to show further falls as preliminary figures, released for the first eight months of the year, indicate that only 414 tonnes were exported and so total exports are unlikely to match those of the preceding year.

The objective of this study is to identify the factors responsible for the inadequacies in the dried shark trade and make recommendations to alleviate the problems.

A considerable proportion of the product exported from the Gambia is derived from the neighbouring countries of Guinea Bissau, Guinea and Senegal. Problems facing effective sourcing from these countries are also examined. All the identified problems were discussed with the economic operators in the trade at a round table conference.

2 PRODUCTION

2.1 Fishing

2.1.1 Species

The major species available in the Gambian waters are long month shark, black shark and hammerhead shark.

2.1.2 Fishing methods

Shark are fished almost exclusively by artisanal fishing canoes but they are also a bycatch of fish trawling. About 30 canoes are currently involved in shark fishing in the Gambia, of which Ghanaians own 26 and three are owned by Gambians but operated by Ghanaian fishermen. Only one canoe is owned and operated by Gambians. In the interest of sustainable fish trade and in order to maximize trade benefits, more Gambians should be deliberately encouraged to go into shark fishing and joint ventures should be encouraged between Gambians and Ghanaians.

The current fishing method involves the use of gill nets which is a selective, passive fishing gear and shark fishing boats are few. They therefore constitute no serious threat to the shark resource base. Scarcity of nets occasionally occurs in the Gambia, to the extent that fishing operations may be suspended while users travel to neighbouring countries to buy some. It is therefore recommended that retail sale of these nets in the Gambia should be encouraged.

2.1.3 Fishing canoes

The Gambian as a sahelian country has little or no raw materials (timber) for canoe construction. Large shark fishing canoes are expensive because either the raw materials for construction or fully built canoes are imported. It is recommended that the design, production and trial of fibreglass shark fishing canoes should be pursued by appropriate agencies in the Gambia, in association with the Japanese International Co-operation Agency or any other donor body.

2.1.4 Premixed fuel for powering motorized boats

Premixed fuel costs 9 dalasis per litre, or more during periods of scarcity. This is scarce in the Gambia but readily available in the Casamance region of Senegal so fishermen from the Gambia are tempted to purchase it there. The customs department in the Gambia classifies this as smuggling and fishermen may be prosecuted for

it. Scarcity of premixed fuel is known to cause loss of fishing days. It is therefore recommended that pre-mixed fuel should be made readily available to shark fishermen in the Gambia so that fishing can continue smoothly.

2.1.5 Fishing grounds

The presence of trawlers and use of conflicting fishing gear at fishing grounds in the artisanal fisheries result in serious damage and loss of fishing materials. Such incidents are reported frequently and often result in loss of investment. The artisanal fishermen can only overcome this problem by making longer fishing trips during which they stay close to their nets. The problem of trawlers encroaching on the artisanal fishing grounds remains a conflict situation. It is recommended that the relevant authorities should intervene to lessen the problem by enforcing the provisions of the law and arranging conflict resolution meetings between shark fishermen and trawler operators.

Table 1 Shark production and exports 1990-1995

| Year | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|------|------|------|------|------|------|
| Exports (tonnes) | 531 | 486 | 633 | 909 | 827 | 781 |
| Value (million dalasis)* | 1.9 | 1.7 | 2.2 | 3.2 | 2.9 | 2.7 |
| Domestic production (tonnes) | 600 | 395 | 194 | 316 | 480 | 498 |
| Imports, re-exported | N/A | 91 | 439 | 593 | 347 | 283 |
| % of exports derived from other countries | N/A | 19 | 69 | 65 | 42 | 36 |
| % of exports accounted for by domestic production | N/A | 81 | 31 | 35 | 58 | 64 |

Source: INFOPÉCHIE

*Department of fisheries, Banjul, Gambia

2.1.6 Sources

The statistics available from 1991 to 1995 indicate that the Gambia produces much less than it exports. Traders confirm that products come from neighbouring countries and are re-exported by the Gambia. For example, domestic production as a percentage of exports peaked in 1991 at 81%. In 1992 and 1993 domestic production constituted less than 50% of total exports. Appreciable rises in domestic production were observed in 1994 and 1995 even though total exports decreased. It is recommended that increased production should be sustained without sacrificing resource conservation. Furthermore, the practice of sourcing products from neighbouring countries for re-export should be encouraged.

2.2 Shark Products

2.2.1 Product forms

The product forms derivable from shark are dried sharkfin, smoked shark and salted, dried shark. While dried sharkfin is almost exclusively exported to the Far East because of its high export value and demand as a choice food, smoked shark products are consumed locally, largely by the Ghanaian population. Salted, dried sharks are exported exclusively to Ghana. Exports of smoked shark products to Nzerckorc in Guinea have recently been reported. Only a small percentage of cured shark is available in smoked form, the bulk is salted and dried. See Table 2.

2.2.2 Handling and processing

After catching, the fresh shark may be eviscerated and salted, dropped into the canoe, deposited on a bare beach and chunked. Thus contamination by sand, dust, insects, bacteria and other contaminating agents is assured. During periods of abundant landings, products are buried on the beach overnight. Quick drying takes about two weeks during which the product loses moisture and becomes hard. Slow fermentation and further drying takes place during the storage period of 2-3 months. Quality considerations at the end of processing and storage include absence of browning and discoloration, product hardness and evidence of adequate salting which is reflected by whitish salt crystals on the product. Product chunking on a bare beach, open-air drying in a sahelian country like the Gambia and the burying process are unhygienic and should be improved upon with a view to eliminating contamination. It is recommended that handling and processing methods should be improved without sacrificing consumer preference.

2.2.3 Transportation

The final product is loaded into hired trucks and transported to the port of Banjul. Finished products for re-export are transported from neighbouring countries to the Gambia by sea, using cargo canoes. Shipping from Banjul to Mankessim takes about 2-4 weeks. Forwarding and clearing activities are efficient at present. Overloading and stormy sea conditions are reported to have caused serious mishaps in this transport system. Annual losses of between 50 000 to 100 000 dalasis have been estimated and more importantly, lives have been lost. In 1994/95, three canoes capsized with losses of 150 bags of dried shark each and a number of people died. It is therefore recommended that canoe operators should be trained in appropriate loading methods and taught the dangers inherent in overloading. Existing laws on such offences should be strictly enforced so that disasters can be averted.

2.2.4 Seasonal abundance

Available information indicates that during the dry, cold season (December to February) water temperature is warmer close to the shore. This condition is apparently favourable to the sharks and so they are caught readily in fishing grounds close to the shore. During the rainy season they go to deeper waters and are more expensive and difficult to catch.

However, because of the long processing and storage period (2-3 months) and other trade practices, such as hoarding to be able to take advantage of scarcity, dried shark products are more readily available during the periods of heavy rainfall (June to September) as shown in Table 2. This also shows that shark is more available in dried than smoked form at the major fish processing centres of Brufut, Gunjur and Tanji.

Table 2 Stockholdings & prices of dried shark products at Gambia's major fish processing centres 1996

| Product | Month | June | July | Aug | Sept | Oct | Nov | Dec |
|--------------|-----------------------|------|------|------|------|------|------|------|
| Dried shark | Stockholdings (bags*) | 3333 | 4050 | 4058 | 4950 | 3205 | 2300 | 3000 |
| | Price (Dalasi/kg) | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Smoked shark | Stockholdings (bags*) | 147 | 167 | 35 | 48 | 28 | 17 | 17 |
| | Price (Dalasi/kg) | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

Source: Brufut, Tanji and Gunjur

*Dried shark=33 kg/bag, Smoked shark=90 kg/bag

2.2.5 Prices

Despite wide fluctuations in stockholdings, available data indicate that the price of dried shark remained stable at 9 dalasi per kg between June and December 1996. Similarly, the price of smoked shark remained at 8 dalasi per kg during the same period. Dried shark fins hardly feature on the market. When they do, quantities are relatively small and prices are extremely high at about 300 dalasis per kg.

3 the Economic operators

3.1 Fishermen

Fishermen who target sharks are largely of Ghanaian origin. Out of the 30 canoes fishing for shark only one is exclusively operated by Gambians, Ghanaians operate the others. Gambian and Senegalese fishermen irregularly land shark as bycatch; these are sold to processors. Big shark fishing canoes have a crew of about 10 and smaller ones about 5. It is evident that Gambians are not adequately involved in shark fishing. It is therefore recommended that effective extension services should be put in place to ensure that willing Gambian fishermen are trained in shark fishing in the interest of sustainable trade.

3.2 Boat owners

Shark fishing boats are owned by investors who employ fishermen. However, the fishermen own the fishing gear and fish on alternate days for themselves and for the boat owners. Under an agreement between fishermen and boat owners, the fishermen take all the catch on days earmarked for them while the boat owners own all the catch on their assigned days. The participation of women in the ownership of shark fishing boats is a welcome development that should be further encouraged.

3.3 Shark processors

Operators in shark processing are predominantly Ghanaian women. They either work in small family units or are hired by canoe owners or fishermen to process shark. Processors buy the raw materials from fishermen but some of the women processors own fishing craft and buy the fishermen's portion of the landings in addition to their own. Other women processors, who do not own boats, have strong relationships with the fishermen from whom they buy their shark and they pre-finance raw material supplies. The processor/trader relationship is also strong as the latter pre-finance procurement of raw materials and collect the finished products 2-3 months later.

Sharkfins are cut off shortly after catch and sold at lucrative prices to specialized dealers, because of their high export value. Men are also involved in shark processing but are much less prominent than women. Willing Gambians should be encouraged to go into shark processing which is currently dominated by Ghanaians. The formation of co-operative societies involving women of both nationalities should be encouraged.

3.4 Packers, loaders and hauliers

Packers are special labourers in the dried shark trade who have acquired relevant packing skills through years of practice. They are paid 2 dalasis for every bag weighing about 33 kg. White bags are used and each contains about 400 pieces of the dried product. These are loaded into hired trucks by "loaders" for two dalasis per bag. The same amount is paid for loading the product into containers at Banjul port, which is about 30 km from "Ghana town" (Brufut). Transportation to the port costs between 700 and 1200 dalasis, depending on the size of the truck, among other factors. The product takes 2-4 weeks to arrive in Tema harbour in Ghana by ship.

3.5 Exporters/Importers

The exporters are largely the same as the importers. They have representatives in both countries. They travel by air in either direction depending on whether they are exporting products from Gambia or receiving products in Ghana. It can be concluded that this dried shark trade, which allows exporters and importers to travel by air, must be one of the most lucrative cured fish trades in West African. Exporters pool their products for transport to the port and for shipment, so that costs are minimized. Markings are put on each bag for easy identification of ownership and this is reflected on the bill of lading.

Twenty major traders are involved in the dried shark trade between the Gambia and Ghana, eight of whom are based in "Ghana town" (Burut) and the rest in Gunjur, Serekunda, Banjul and other settlements in the Gambia. The traders have representatives in Ghana who arrange for product clearing from the port, payment of relevant fees, transportation to Mankessim and marketing of the product with or without the exporter, who may travel by air to Ghana to supervise product sales. Some traders regularly travel to the Gambia to collect purchases made by their agents and return, for about 3 months on each occasion, to sell the products in Ghana.

3.6 Wholesalers and retailers

Wholesalers, retailers and hauliers are also involved in the dried shark trade in Ghana. The wholesaler purchases in bulk at Mankessim and distributes the product to smaller wholesalers and retailers in other parts of Ghana.

Detailed statistics are not available but it is evident from the above that economic operators in the dried shark trade are many and diversified both in the Gambia and Ghana. The dried shark trade is therefore important to

both economies and relevant establishments in both countries should ensure that trade practices are conducted in such a way as to ensure sustainability.

4 TRADE

The dried shark trade involves the Gambia, Guinea, Guinea-Bissau and Senegal on the one hand and Ghana and the Gambia on the other. Table 1 indicates local production as well as those sourced from neighbouring countries and re-exported from the Gambia. Supplies from the neighbouring countries are quite significant and any efforts focused on the improvement of the trade between the Gambia and Ghana will have limited impact if the problems of product sourcing from neighbouring countries are not addressed.

4.1 Domestic trade

The demand for dried shark products by Gambians is low. This is due largely to low taste preference for the product, religious and social taboos and the availability of a large number of other preferred forms of fish products. Domestic demand is largely restricted to the Ghanaian community.

4.2 Exports

4.2.1 Product destination

The major destination of dried shark products originating from the Gambia is Ghana. This trade is conducted exclusively by Ghanaians. Gambians have recently begun to export smoked shark to Guinea (Conakry and Nzérékoré) but the volume of this trade is relatively low compared to that between Ghana and the Gambia. The port of destination in Ghana is Tema, from where products are transported in trucks to Mankessin, about 150 km from Tema. Further distribution inland takes place at Mankessin.

4.2.2 Export volume and value

The volume and value of dried shark exports from 1990 to 1995 are summarized in Table 1. The disparities between exports and domestic production are accounted for by dried shark products from the neighbouring countries of Senegal, Guinea and Guinea-Bissau, transported to the Gambia and re-exported to Ghana. Revenue paid to the government peaked in 1993 at 3.2 million dalasis, declining to 2.9 million dalasis in 1994 and 2.7 million dalasis in 1995.

4.2.3 Export formalities

As is the case for exports of all fish and fishery products from the Gambia, shark exporters obtain export permits and health certificates prior to consignments being exported. The Fisheries Department issues export permits, which are applied for on a standard form. The Department makes an inspection of the products for certification based on quality, hygiene and packaging. Once satisfied, an export permit is issued to the exporter. The Department of Health also conducts an inspection of the products for the issuance of health certificates.

Based on the FOB value of the products, presently set at 4 dalasis per kg, the value of the consignment is indicated on the export permit. On the basis of this value, the Department of Customs and Excise charges export duty at 10%. Custom entries are completed and shipping documents finalized with shipping agents. Freight charges used to be paid locally but arrangements between traders and shipping agents now favour payment of the freight charges in Ghana.

4.2.4 Monthly trends in dried shark exports

Based on the detailed monthly export figures for the period 1990-1995 and preliminary figures for 1996, indicated in Table 3, the largest volume of exports was recorded in November. No shark products were exported

in August except in 1996, largely because that is the peak of the rainy season when high ambient humidity and rainfall are not conducive to product processing and handling. Another factor is the low level of fishing activity during this month. Little is exported in July and September either.

Table 3 Monthly dried shark exports in kilograms, 1990-1996

| Month | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | Total |
|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|
| January | - | 33 297 | - | 126 060 | 12 030 | 32 091 | 105 150 | 308 628 |
| February | - | 113 418 | 123 735 | 42 660 | 31 185 | 78 248 | 6 000 | 395 246 |
| March | 110 001 | - | 33 435 | 117 312 | 105 363 | 124 302 | 82 810 | 573 223 |
| April | 32 490 | 41 005 | 71 396 | 62 139 | 16 560 | 14 949 | 30 570 | 269 109 |
| May | 115 257 | 109 308 | 20 070 | 23 067 | 160 844 | 92 380 | 64 653 | 585 579 |
| June | 156 123 | 84 321 | 193 692 | 158 742 | 67 815 | 159 213 | 73 820 | 893 726 |
| July | - | - | 3 729 | 31 272 | 34 800 | 33 672 | 44 130 | 147 603 |
| August | - | - | - | - | - | - | 6 150 | 6 150 |
| September | - | 23 100 | - | - | 50 630 | - | - | 73 730 |
| October | - | 53 380 | - | 59 530 | 160 077 | 44 010 | - | 316 997 |
| November | 111 183 | 28 060 | 171 537 | 161 828 | 108 273 | 156 630 | - | 737 511 |
| December | 6 400 | 53 573 | 15 296 | 126 166 | 79 640 | 45 420 | - | 326 495 |
| Total | 531 454 | 539 462 | 632 890 | 908 776 | 827 217 | 780 915 | 413 283 | 4 633 997 |

Source: Department of Fisheries, Banjul, The Gambia

4.2.5 Yearly trends in shark product exports

Exports rose until 1993 and have fallen since. Though domestic production increased appreciably, by 52% from 1993 to 1994, only a slight increase, 4%, was recorded in 1995. Increased domestic production should be pursued without sacrificing resource conservation. The major area of concern is product sourcing from neighbouring countries, which declined drastically by 41% from 593 tonnes in 1993 to 347 tonnes in 1994 and by a further 18% in 1995. Problems affecting product sourcing from neighbouring countries should be investigated, as this trend has not been explained.

4.3 Trade problems

4.3.1 Credit repayment problems

Importers in Ghana encounter credit repayment problems. Products supplied to wholesalers are sometimes not paid for in good time or not paid for at all. This often leads to conflicts. It is recommended that wholesalers should of necessity belong to a co-operative organisation, to which they should be financially committed. Such an organisation should act as a guarantor for products supplied on credit.

4.3.2 Single market problems

The only reported destination for dried shark of Gambian origin is Ghana. The need for market diversification is imperative as policy changes in the destination market may adversely affect trade. Product diversification and taste-preference research should be conducted prior to test marketing in other target markets. This exercise, which should involve traders on sub-regional basis, should be conducted during the second year of the EU programme implementation.

4.3.3 Loss of finished products

Stormy sea conditions and the overloading of canoes with finished products from neighbouring countries have been responsible for product losses and loss of lives. Hauliers should be trained in loading and safety regulations. The wearing of life jackets should be made compulsory on these boats and other safety laws should be enforced.

5 CONCLUSION

The dried shark trade between Brufut in the Gambia and Mankessim in Ghana is a concrete example of regional co-operation, which should be encouraged. Such ventures, involving grassroots economic operators, are capable of achieving sustainable regional integration and economic development. Constraints identified in this study should therefore be addressed by the relevant organisations in both countries in the mutual interest of all concerned.

6 SUMMARY OF CONSTRAINTS AND RECOMMENDATIONS

| Causes of the problem | Recommendations | Follow-up action by |
|--|--|---|
| 1. Regular scarcity of shark fishing gear in the Gambia | Encourage retail trade of shark fishing nets in the Gambia | Dried shark exporters Department of Fisheries |
| 2. Destruction of shark fishing nets by trawler operators | Arrange regular meetings with shark fishermen and trawler operators to resolve conflicts in fishing activities | Department of Fisheries |
| 3. Scarcity of pre-mix fuel | Make pre-mix fuel available locally | Oil marketing companies Fishermen's organisation |
| 4. Expensive nature of canoes used for shark fishing due to imported inputs. | With donor agencies, design, produce and trial fibreglass boats. | Department of Fisheries Fishermen's organisation |
| 5. Improper handling and processing resulting in product contamination, discoloration and rehydration. | Intensify extension services for the improvement of product handling, processing and storage. Introduce HACCP concept to shark fishermen and processors. | Department of Fisheries INFOPECHE |
| 6. Overloading of boats used for transporting finished products from neighbouring countries. | Boat operators should be trained in proper loading and the dangers of overloading | Maritime transport authorities in the Gambia Department of Fisheries |
| 7. Problems of credit recovery from wholesalers and retailers in Ghana. | Give credits only to traders who belong to and are guaranteed by their co-operative societies | Exporters |
| 8. Products targeting single markets are prone to many problems of sustainability. | Identify other markets for the product | Exporters |



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Sharks belong to the Chondrichthyes class, together with skatas, rays and chimaera, and are found in a wide variety of habitats worldwide, employing many biological strategies. Although sharks make up only a small percentage of the world's recorded fish landings, they are extremely versatile and are a valuable resource. They are of primary importance in some regions of the world, sustaining important fisheries in several countries. Moreover, they are a cheap but valuable source of protein for coastal communities dependent on subsistence fisheries. Humans can utilize much of the carcass for food or other uses. Sharks are exploited for their meat, fins, skin, teeth, cartilage, liver and other internal organs. It is not possible to utilize every shark for all these uses, as the methods of preservation and preparation are often mutually exclusive and not all shark species are suitable for all applications. This report details the species used and the methods of preparation for the various purposes. It assembles information, as well as the latest statistics available, from those parts of the world where sharks are important economically as a substantial fisheries sector, a contribution to human food or a valuable trading item.

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