Proposal to include the Spiny Dogfish (*Squalus acanthias*) in Appendix II CITES proposed by the Federal Republic of Germany (on behalf of the member states of the European Community)

Executive summary

- The spiny dogfish (*Squalus acanthias*) is a small temperate water shark of shelf seas in the northern and southern hemispheres. Although naturally abundant, it is one of the more vulnerable species of shark to over-exploitation by fisheries because of its late maturity, low reproductive capacity, longevity, long generation time (25-40 years) and hence a very low intrinsic rate of population increase (2-7%). Its aggregating habit makes it vulnerable to fisheries. Most stocks are highly migratory.
- *Squalus acanthias* meat is highly valued, particularly in Europe, with European market demand driving fisheries that preferentially target aggregations of mature (usually pregnant) females. The small fins enter international trade. Other products (liver oil, cartilage, skin) are less fully utilised. A DNA test will soon be available for parts and derivatives.
- Some *Squalus acanthias* fisheries have been documented for over 100 years. Stock assessments in the North Atlantic document declines of 75% and 95% from baseline, the former in just 10 years. CPUE (catch per unit effort)and landings data from other regions indicate that some other stocks have experienced a range of similar levels of decline.
- Management is in place in only a few regions and in only a limited part of the range of highly migratory stocks. In the majority of cases, current management is obviously inadequate to reverse current declining trends and to ensure future sustainable fisheries. No Regional Fishery Management Organisation (RFMO) is managing fisheries for this species.
- An Appendix II listing is proposed for *Squalus acanthias* in accordance with Article II, paragraph 2(a). It meets the criteria in Resolution Conf. 9.24 (Rev.) criterion Bi) and ii) of Annex 2a (AC19 Doc. 9) for Northern Hemisphere and South American stocks, where several stocks have experienced significant and ongoing population declines. A large proportion of the products of current fisheries in the North and Southwest Atlantic enter international trade. It also clearly meets the existing and proposed new criteria for addition to Appendix I.
- The increasing fishing pressure on South American stocks that resulted from the serious depletion of North Atlantic stocks, in particular, has more recently progressed to Indo-Pacific stocks. The latter qualify for listing under paragraph 2(b) of Article II ("*species which must be subject to regulation in order that trade in specimens of certain species included in Appendix II in accordance with Article II, paragraph 2(a), may be brought under effective control*").
- *Squalus acanthias* meets the guidelines suggested by FAO for the listing of commercially exploited aquatic species. It falls into FAO's lowest productivity category of the most vulnerable species; those with an intrinsic rate of population increase of <0.14 and a generation time of >10 years (FAO 2001). Some stock declines have clearly exceeded the qualifying level of 20% or less of historic baseline, or are declining so rapidly as to qualify for Appendix I listing under the FAO guidelines.
- The 2003 IUCN Red List assessment for this species is Near Threatened. North Atlantic stocks are assessed as Vulnerable and Endangered based on past fisheries records, stock assessments, and continued unsustainable exploitation. Assessments for other regional stocks and a review of global status are underway. An Appendix II listing would help ensure that exploitation of this globally threatened species is regulated and monitored, that international trade is not detrimental to the survival of the species, and contribute to the implementation of the UN FAO International Plan of Action for the Conservation and Management of Sharks.

13th Meeting of the Conference of Parties, Bangkok, 2-14 October 2004

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Inclusion of the spiny dogfish *Squalus acanthias* Linnaeus 1758 on Appendix II of CITES in accordance with

- Article II, paragraph 2(a), based on Resolution Conf. 9.24 (Rev.) criterion Bi) and ii) of Annex 2a [AC19 Doc. 9 *Review of the criteria for amendment of Appendices I and II (Decision 12.97)*] for Atlantic stocks;
  and
- Article II, paragraph 2(b), for Indo-Pacific stocks.

B. Proponent

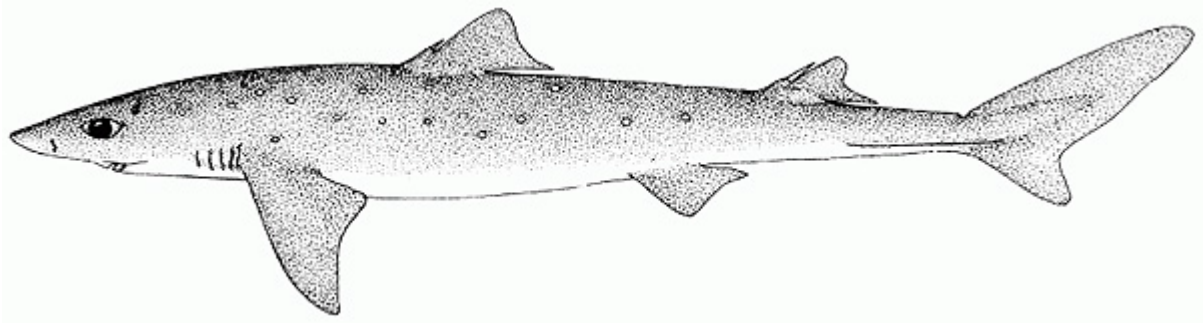
Germany (on behalf of the Member States of the European Community)

C. Supporting statement

1. Taxonomy

1.1 Class:	Chrondrichthyes (Subclass: Elasmobranchii)	
1.2 Order:	Squaliformes	
1.3 Family:	Squalidae	
1.4 Species:	*Squalus acanthias* Linnaeus, 1758.	
1.5 Scientific synonyms:	See Annex 1.	
1.6 Common names:	English	spiny dogfish, spurdog, piked dogfish
	French	aiguillat commun
	Spanish	mielga
	Danish	pighaj
	Italian	spinarolo
	German	Dornhai

2. Biological parameters



Usually less than 150cm in length

Figure 1. Spiny dogfish *Squalus acanthias* (*Source*: FAO Species Identification Sheet, 2003)

The spiny dogfish is a very long-lived, slow-growing and late maturing species with limited reproductive capacity and one of the lowest population growth rates calculated for any shark species:

2.3% annual rate of population increase from maximum sustainable yield (MSY) in the Northeast Pacific (Smith *et al*. 1998), 4-7% in the Northeast Atlantic (Heessen 2003) and annual mortality of 0.092 in the Northwest Atlantic (US National Marine Fisheries Service). Age at maturity varies considerably between stocks, ranging from 12-23 years for females and 6-14 years for males (Compagno 1984). Maximum age is at least 34-40 years (Fordham in press), with some estimates approaching or surpassing 100 years (it is not possible accurately to age large animals) (Compagno 1984). The reproduction cycle of spiny dogfish makes it particularly vulnerable to over-fishing. Generally, they have a pregnancy of 18-24 months with females giving birth once every two years. They produce small litters of 2-11 pups (larger older females have larger litters), at a sex ratio of 1:1. Pups are 18-33cm long at birth; females mature at 75-94cm (depending upon stock). Two tagged male spiny dogfish recaptured in the Northeast Atlantic in 1999 after 35-37 years at liberty had grown an average of only 3.3mm and 2.7mm per year. The maximum observed sizes of spiny dogfish (males and females respectively) were 100 and 250cm in the Northwest Pacific, 107 and 130cm in the Northeast Pacific, 86 and 108cm in the Northwest Atlantic, and 83 and 110cm in the Northeast Atlantic (Ketchen 1972, Heessen 2003).

2.1 Distribution

Spiny dogfish *Squalus acanthias* occurs world-wide on the continental shelf, from the intertidal to the shelf slope, in temperate and boreal waters, within water temperatures of 7-8°C to 12-15°C. The species is most common in coastal waters and is therefore caught in fisheries operating inside the 200-nautical mile Exclusive Economic Zones (EEZ) of States. The principal populations are found in the Northwest and Northeast Atlantic (including Mediterranean and Black seas), Northeast and Northwest Pacific (including the Sea of Japan), the South Atlantic and Southeast Pacific off South America, and New Zealand, with smaller populations off South Africa and southern Australia. Some populations are largely sedentary, others migrate long distances, but mixing between populations is limited.

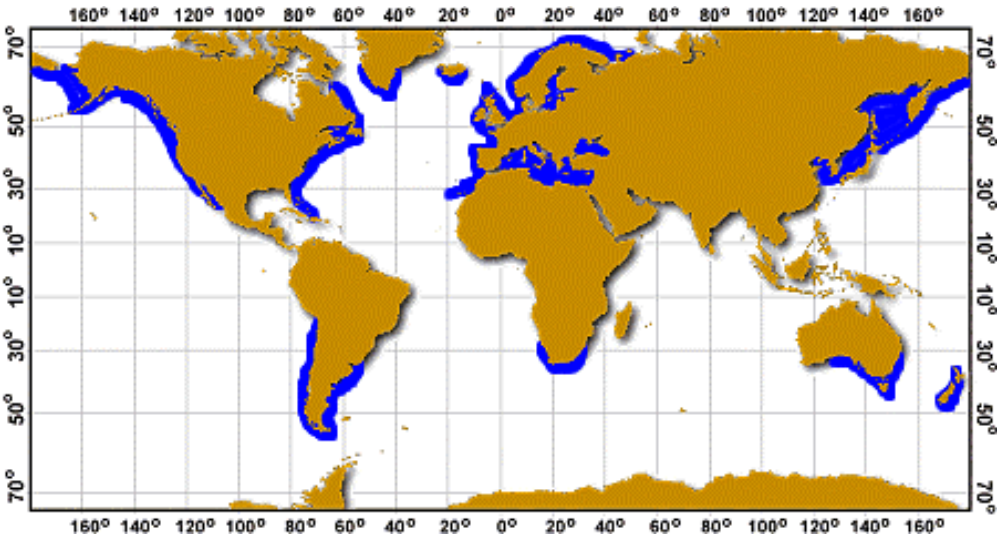


Figure 2. Global Spiny Dogfish distribution (*Source*: FAO 2003)

Spiny dogfish is usually found swimming just above the seabed, but also moves throughout the water column along the continental shelf and is recorded to depths of 900m (Compagno 1984) although most common from 10-200m (McEachran and Branstetter 1989). Spiny dogfish are usually found in large schools, segregated by size and sex with, for example, large pregnant females schooling together (Compagno 1984), exposing them to fisheries that target these individuals (ref. 2.3).

Templeman (1944) suggested that mature females were present off Newfoundland (Northwest Atlantic) from January through May, and their pups in inshore areas during the same season, while Castro (1983) reported that, in the North Atlantic, spiny dogfish pups are found offshore in deepwater wintering grounds. Primarily epibenthic, they are not known to associate with any particular habitat (McMillan and Morse 1999). They are thought to mate in winter (Castro 1983, Compagno 1984). In

Australia, breeding occurs in large bays and estuaries (Last and Stevens 1994), while North Atlantic mating grounds are still unknown.

2.2 Habitat availability

Coastal development, pollution, dredging and bottom trawling affect coastal or benthic habitats on which spiny dogfish and their preys are dependent (ASMFC 2002). Such environmental threats may have potential impacts on spiny dogfish stocks associated with areas of habitat degradation and loss.

2.3 Population status

Stocks of spiny dogfish in the Northeast Atlantic (Figures 3 and 4) were estimated to be 'severely depleted' in the DELASS (Development of Elasmobranch Assessments) report of Heessen (2003). The DELASS team used a Bayesian assessment approach based on a Schaefer stock production model, and incorporating other relevant data to set 'prior' distributions for key parameters. The base case assessment estimated that the Northeast Atlantic stock in 2001 was depleted to below 5% of its initial 'carrying capacity' biomass at the start of the catch data series in 1906. Other model scenarios testing alternative plausible values of parameter inputs all estimated that the stock had declined to between 2 and 9% of its initial biomass.

In the IUCN Red List, the Northeast Atlantic subpopulation of spiny dogfish is currently categorised as 'Endangered' (EN) (Fordham 2003a). The red list classification criteria (A2bd+3bd+4bd) confirm that this designation was made on the basis of past, ongoing and estimated future reductions in population size of at least 50%, as indicated by both abundance indices and catches. This assessment will be reviewed by the IUCN Shark Specialist Group – the Red List Authority for chondrichthyan fishes, in 2004 in the light of the DELASS assessment (Sarah Fowler personal communication).

Annex V of the OSPAR Convention on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area requires OSPAR to develop a list of threatened and declining species and habitats in need of protection or conservation in the OSPAR maritime area (the Northeast Atlantic). OSPAR member states were invited in 2001 to submit proposals for inclusion on this list. In response, Belgium proposed listing spiny dogfish *Squalus acanthias* in the North Sea on the basis that it is a sensitive species and had declined significantly in their national waters. This species has not yet been added to the OSPAR list of threatened and/or declining species and habitats

The Northwest Atlantic population of spiny dogfish is also over-fished. According to recent stock assessments (SARC 2003), reproductive biomass peaked in 1989 and then declined by more than 50% by 1997. Average weight of landed females decreased from 4kg in 1987 to 2kg in 2000. The 2001 pup estimate was the lowest in the 33-year time series for the fifth consecutive year. Overall, mature female biomass has been reduced 75% in the past ten years. In 2003, a stock assessment review panel found that the overall biomass of spiny dogfish had decreased by over one-third since the early 1990s, and that mature females accounted for only 15% of the stock. In addition to the alarming decline in the number of females, trends in smaller litter sizes, smaller pups in the litters and very low pup survival rates, have persisted since the mid 1990s.

The IUCN Red List categorises Northwest Atlantic spiny dogfish as 'Vulnerable' (VU), using the same red list criteria as for the Northeast Atlantic; this designation was made on the basis of estimated reductions in population size of at least 30% (Fordham 2003b) and will also be reviewed in 2004. Regional Red List assessments are currently underway for other populations of spiny dogfish. Fisheries and population trend data indicate that populations in the North Pacific and along the southern South American coast may, in particular, also be depleted and qualify for inclusion in the IUCN Red List of Threatened Species. At global level, spiny dogfish is categorised in the IUCN Red List as Near Threatened (NT). The IUCN Shark Specialist Group consultation on draft red list assessments for all regional populations leads to the new review of the global assessment in 2004.

Some range States have included the species in their Red List, such as Germany where spiny dogfish is listed as vulnerable (VU) (Binot al. 1998). [Further information on national red listings will be completed later].

This important and wide-ranging commercial species is particularly vulnerable to overfishing because of its late maturity, low reproductive capacity, linked to its long gestation time, between 18 to 22 months (FAO Species Identification Sheet 2003), and longevity. These biological parameters are aggravated by the fact that fishers preferentially target the largest mature (often pregnant) females, whose aggregating habit and predictable migration patterns make it relatively easy for fishers to continue to obtain good catches even when the whole stock is seriously depleted. Spiny dogfish are also caught as small as 50cm – around 4-5 years old, and are fully recruited in the fishery at lengths of approximately 70-80cm, at ages above around 8 years old (Heessen 2003). Female spiny dogfish in the North Atlantic are, therefore, being exploited before they reach maturity.

2.4 Population trends

On a global scale, based on 20th century reported landings, the most important spiny dogfish commercial stocks are (or were historically) in the shelf seas of the Northeast Atlantic; these are now also the most depleted. According to FAO, 89% of the world spiny dogfish landings reported between 1950 and 2001 (excluding miscellaneous sharks, etc) were taken in this region (Figure 5). Over this period, landings were sustained at levels of 30-50,000 tonnes (1 tonne (t) = 1000kg) per year for most of the 1960s, 70s and 80s. Since the mid 1980s, spiny dogfish reported landings in the Northeast Atlantic have decreased particularly steeply (Figures 7 to 9; Tables 2 & 4) while those elsewhere have mostly increased (Figure 6; Table 1a). By 2001, Northeast Atlantic reported landings had dropped to 27% of their historical FAO-reported peak of nearly 50,000 t, taken in 1972 (Table 1b). Other stocks yielding significant landings are in the Northeast Pacific (off western North America), the Southwest Pacific (mainly New Zealand) and Northwest Pacific, where the high landings reported in Japanese documents (e.g. Taniuchi 1990) are apparently not included in FAO statistics. Landings reported from these parts of the world often appear to show some 'boom and bust' cycles, followed, more recently, by an overall increase up to 2000, and a slight drop in 2001 (Figure 6; Table 1a). Landings reported in 2001 in the Northwest Atlantic, as well as the Northeast and Southwest Pacific were 56%, 80% and 58% respectively of their historical peak landings from 1950 to 2001 (Table 1b). Much of the following descriptions of regional trends are from the review by Fordham (in press).

Northeast Atlantic

The spiny dogfish fishery is by far the most important of the directed fisheries for elasmobranchs in the Northeast Atlantic (Figures 2 & 3). Catches are taken from north of the Bay of Biscay to the coast of Norway, including the North Sea and around the west of Ireland and Scotland. France, Ireland, Norway and United Kingdom all take spiny dogfish in directed fisheries and as an important by-catch in trawl fisheries. Other European countries make smaller landings (see Figure 7 and Tables 2a & b). Available studies indicate that there is a single Northeast Atlantic unit stock (Heessen, 2003). Early landings rose to 20,000t, dropped to 7-8000t in the early 1940s, due to a cessation of fishing during World War II, and fluctuated between 30,000 and 60,000t throughout most of the 1950s, 60s, 70s and 80s (Figures 7 to 9).

According to Heessen (2003), between 1950 and 1970, Norwegian longliners working north of Bergen took 70% of the total international landings from the Northeast Atlantic. The main fishing grounds were off the west coast of Norway in winter-spring and on the banks north of Scotland in summer-autumn. This fishery collapsed in 1978 following an increase in fishing effort with automatic longline baiting and handling systems. Norwegian reported landings in 2001 were only 4% of their historic maximum taken in 1961 (Tables 2a & b).

French trawlers have also fished spiny dogfish since 1977 (Figure 7), working from the Faeroes south to northern Biscay, and by long-lining in the Celtic Sea and the western English Channel. Most of the French landings since 1979 have come from the Celtic Sea, where catches peaked at 6-8000t in 1981-84, and fell below 1000t by 1993. Similar patterns were observed in the English Channel, the North Sea, the west coast of Scotland, the Irish Sea and the west of Ireland. Overall, French landings decreased from just below 15,000t in 1983 to 1333t in 2001. French reported landings in the early 2000 were only 9% of their historic peak (Figure 7; Tables 2a & b).

Today, based on landings reported to the International Council for the Exploration of the Seas (ICES), the main fishing grounds for spiny dogfish are in the North Sea (ICES area IV), Northwest Scotland (area VI) and the Celtic Sea (VII), all of which have reported substantial reduction in landings from former peaks (Figure 8). Scottish and other UK trawlers and seiners have fished for spiny dogfish in

these waters both as directed and by-catch fisheries since World War II (Figure 8). Landings by Scottish vessels accounted for 43% of the total of 16,000t landed from the Northeast Atlantic in 1996. For the overall period 1950 to 2001, UK vessels caught 38% of the total landings from the Northeast Atlantic (Table 2). UK landings in 2001 were 55% of the total reported landings from the Northeast Atlantic. According to the ICES landings statistics (which include some early records excluded by FAO as 'unidentified' sharks), landings in 2002 were just under 18% of the peak catches taken in 1963 (Figure 5). The DELASS stock assessment (Heessen 2003) indicates a decline to 5% of baseline.

Northwest Atlantic

Off the eastern US, landings increased from 500t in the early 1960s to 9689t in 1966 and peaked in 1974 at 25,620t. Foreign fleets (from the former Soviet Union, former East German Republic, Poland, Japan and Canada) accounted for virtually all the reported catch from 1966 to 1977 (NOAA 1995). Annual US commercial spiny dogfish landings from the Atlantic increased from only a few hundred tonnes in the late 1970s to around 4500t during 1979-1989. Increasing European demand led to a sevenfold increase in landings, to a peak of 27,200t in 1996. Discards are poorly monitored but are thought to be significant, exceeding landings in some years (NOAA 1998). Landings fell to 14,906t in 1999, prior to the introduction of management (Rago and Sosebee 2002), but federal quotas have continually been exceeded as a result of continued high levels of fishing activity in state waters. US recreational catches increased from about 350t annually in 1979-1980 to 1700t in 1989, averaged 1300t from 1990-1994, then decreased in 1996 to 386t (NOAA 1998). Data collected from both the US commercial landings and from research vessel survey catches indicate a pronounced and consistent decrease in average length of females in 2001-2003 compared to 1985-1988. The low abundance of pups has continued for seven consecutive years. In the long term projection, which accounts for the apparent lower survival of pups from smaller females, the lower spawning potential leads to stock collapse under current fishing mortality in the region (SARC 2003).

In the Canadian Atlantic, spiny dogfish are targeted in the Bay of Fundy, Scotian Shelf and Gulf of St. Lawrence. Foreign landings on the Scotian Shelf peaked at 24,000t in 1972-1975, but were then replaced by national fisheries (ICES 1997). Atlantic Canadian landings prior to 1979 were insignificant (OWC 1996). A directed fishery has since developed off the Maritimes Region, trans-bounder to Canada and US Atlantic coastal waters. Landings increased from an average of 500t from 1979-1988 to 1800t in 1994. After a subsequent decrease to roughly 400t in 1996 and 1997, spiny dogfish landings (primarily from Nova Scotia) more than doubled in 1998 and 1999, reaching a peak in 2000 of 2660t (in excess to the US quota) (Rago and Sosebee 2002).

Northeast Pacific

Spiny dogfish have been fished in British Columbia (Canada) for over 4000 years. More intense exploitation (for liver oil and meat) began in the late 1800s (Ketchen 1986) and evolved into the region's most important shark fishery. By 1870, spiny dogfish were surpassing whales in economic importance, producing 190,000 litres of oil, mostly for export to Great Britain. In 1876, oil exports constituted at least 24% of the total value of all fish. Production peaked in 1883 at more than one million litres, equivalent to 9000-14,000t of round weight exports (Bonfil 1999). Ketchen (1986) speculates that a combination of factors (including the advent of petroleum lubricants, lighting fuels and electric lamps) led to fishery collapse around 1910. From 1917 to 1939, spiny dogfish was used for fishmeal and meat exported to the US. Increased value of liver oil resulted in an expansion of the fishery and by 1944, spiny dogfish supported the most valuable Canadian west coast fishery (Ketchen 1986). Landings reached 31,000t then fell to <3000t in 1949. Fishable biomass had been reduced by 75% (reviewed in Anderson 1990) in 1950, when the synthetic production of vitamin A led to the collapse of the oil market. The fishery has since been constrained by low demand (Bonfil 1999) and spiny dogfish are now considered to be a minor, mostly by-catch, component of the region's groundfish fisheries. Only a few vessels currently target spiny dogfish. Trawlers take roughly 40% of the region's landings and discard significant amounts (Bonfil 1999).

Washington is the only US Pacific state with a directed spiny dogfish fishery, mostly in Puget Sound. The state's landings have recently decreased dramatically. In 1995, the Puget Sound spiny dogfish population was considered to be nearly "fully utilized" (Palsson *et al*. 1997). By the late 1990s, however, landings had decreased by more than 85% (Camhi 1999).

Spiny dogfish are also the predominant shark species taken off Alaska, which banned directed shark fishing in 1998, but where spiny dogfish bycatch (90% discarded) comprises the bulk of shark landings (Camhi 1999). In 1997, over 1000t of total shark catches were reported from the region's groundfish fisheries. Catch rates have increased 20-fold in the Gulf of Alaska in the late 1990s and five-fold in Prince William Sound in recent years (NMFS 2000).

Mediterranean and Black seas

Although there is only limited data on landings for the Mediterranean and Black Seas, some catch reduction has been observed (Aldebert 1997). Overall, the stock seems likely to be in a better state than in the Northeast Atlantic.

Northwest Pacific

Japanese coastal and offshore fisheries (longline, trawl & gillnet) have historically taken large amounts of spiny dogfish off the Northeast coast and in the Sea of Japan. Taniuchi (1990) reported that catches dropped from more than 50,000t in 1952 to only 10,000t in 1965. The following trends are reported by the Government of Japan Fisheries Agency (2003). Offshore trawl catches of spiny dogfish were over 700t in 1974-1979. Since then, catches have decreased to 1-200t in the late 1990s and up to 2001. Catch rates for Danish seines and bull trawls fell from 100-200kg per haul in the mid 1970s to 10-20kg per haul in the late 1990s. This 10-fold reduction in CPUE (catch per unit effort) may indicate that stocks have declined to a similar extent during this period. In the Sea of Japan, spiny dogfish have been fully exploited with longlines and trawl-nets since before 1897. Harvests in this region from 1927 to 1929 were 7500 to 11,250t, accounting for 17-25% of Japan's overall catch. Available statistics since 1970 show a decrease in CPUE from 8-28 units in the 1970s, to only 1-5 between 1995 and 2001, an overall decrease of around 80-90%.

Australasia

Considered coarse, spiny dogfish meat is little valued in Australia (Last and Stevens 1994). Tasmanian recreational gillnet fisheries do, however, take substantial amounts (Simpfendorfer, pers. comm. in Fordham in press). FAO data for 1977-1989 show a significant increase in spiny dogfish landings in New Zealand. From 1989-1992, spiny dogfish made up 33% of the shark catch (Bonfil 1994), with 2831t to 5607t landed annually (Stevens 1993). Recent anecdotal reports indicate increased demand for spiny dogfish off New Zealand, with industry publications encouraging fishermen to land rather than discard the species. New Zealand trawl surveys indicate increasing spiny dogfish biomass between the mid 1990s and 2002 (Francis, pers. comm. in Fordham in press) and reported landings increased from 3273t in 1991-1992 to 13,076t in 2001-2002 (Anon. 2003), possibly driven by growing exports to the EU (Figure 10, Table 5). New Zealand also experiences high levels of unreported discards of this species. Recognising this cumulative pressure from targeted fishery as well as discarded by-catch and the high vulnerability of the species to over-fishing, the government of New Zealand included spiny dogfish in its Quota Management System (QMS) and is currently developing proposals to limit its fishery to prevent overexploitation (Anon. 2003).

South America

Squalus acanthias is one of the most important coastal commercial species along the southeastern coast of South America (Uruguay and Argentina), where landings of the genus have decreased considerably. It is also taken as bycatch in mixed demersal fisheries and the target fishery for *Lophius gastrophysus*. Patagonian trawlers fishing for hake and shrimp take a bycatch of spiny dogfish. Rising effort in these fisheries and a lack of bycatch control is considered to be a threat to spiny dogfish and other elasmobranch populations in the region (Van Der Molen *et al*. 1998). As in many other regions, large pregnant females are commonly targeted. The impact of rising fishing efforts, targeting in particular whitemouth croaker *Micropogonias furnieri*, from 1994 to 1999 in Argentina and Uruguay coastal areas was analysed based on biomass indices of chondrichthyan species. Spiny dogfish was listed as one of the species that suffered a more than 50% drop in their abundance in along the north coast of Argentina and south Uruguay (Massa *et al*. 2002). It is not possible to assess the status of the population of this species in Argentinean waters. The volume of spiny dogfish landings by the Argentinean fishing fleet is also unknown because its records are kept at the genus level only. Based on the growing demand for cartilaginous fish in Argentina, the development of a commercial exploitation of this species may be expected in the future (Victoria Lichtstein, CITES Management Authority of Argentina, *in litt*. to TRAFFIC Europe, 27 October 2003). Discrepancies between South American exports of spiny dogfish (Figure 10; Table 5) and landings reporting to FAO

(Figure 6) by the same countries, suggest a lack of accurate reporting to FAO by some members of the organisation.

South Africa
Spiny dogfish are considered a nuisance by fishermen off South Africa and are not currently targeted as a commercial species. Demersal trawl spiny dogfish catch for the South Coast was recently estimated at 4.7t, 99% of which is discarded. Off the West coast, an estimated 3.4t is taken annually (100% discarded) (Smale pers. comm., in Fordham in press).

2.5 Geographic trends

No changes have been reported in the geographic distribution of this species.

2.6 Role of the species in its ecosystem

Spiny dogfish is a voracious and opportunistic predator that feeds mainly on a variety of bony fishes, such as herring, haddock and even cod (ASMFC 2003), and to a lesser extent invertebrates (Compagno 1984). It is preyed upon by some larger sharks, and marine mammals (Compagno 1984). The abundance of this elasmobranch does not appear to affect the recruitment of groundfish (Link *et al*. 2002 in ASMFC 2003, Bundy 2003).

2.7 Threats

The principal threat to this species worldwide is over-exploitation, whether by fisheries that target spiny dogfish, or by fishing gear that catches the species incidentally as a by-catch.

2.7.1 Directed fisheries

This is a valuable commercial species in many parts of the world, caught in bottom trawls, gillnets, line gear, and by rod and reel. Widely utilized for its flesh, particularly valued for human consumption in Europe, its liver oil and fins are also consumed. Some former fisheries were driven mainly by the demand for oil, until synthetic vitamin A became available and this market collapsed. Despite low quality, spiny dogfish fins have been routinely traded to East Asia (for shark fin soup) for at least the two last decades of the 20th century (Rose 1996). Cartilage and hides are also utilised, and landings to produce fishmeal and fertiliser if markets for human consumption are not available (Compagno 1984). They have also been utilized as scientific specimens for teaching purposes.

2.7.2 Incidental fisheries

Because it occurs in areas where gill nets, longlines and trawls are used, spiny dogfish is caught by these gears which often have smaller mesh size and cause the mortality of young individuals, which may not reach the retail market because they are discarded (ASMFC 2003, Anon. 2003, Bundy 2003). In EU waters for instance, deepwater bottom trawling for Nephrops and shrimps along the south coast of Portugal is the fishery that has been identified as most involved in spiny dogfish discards (European Parliament 1999). The US Northeast Regional Stock Assessment Review Committee (SARC) assessed the relative importance of spiny dogfish by-catch for the period 1968-2002, and estimated that the mean of discards (16,700t) represented more than double the mean of US reported landings (7200t) from the region (SARC 2003), part of the Northwest Atlantic (Figure 3). In the Southwest Atlantic, a study undertaken in Argentina and Uruguay estimated that the abundance of spiny dogfish populations dropped by 50% following the intensification of fishing activities, particularly the coastal whitemouth croaker *Micropogonias furnieri* fishery (Massa *et al*. 2003). These practices impact spiny dogfish stocks and are not taken into consideration in national fisheries statistics since they are generally not reported.

3. Utilisation and trade

Compared to most other shark species, catch and trade in spiny dogfish are well documented. This is due to the long history of domestic and international utilization of the spiny dogfish. It is by far the most important shark species landed commercially in the Northeast Atlantic, where it has been of

considerable importance to international fisheries for well over 40 years (Rose 1996). Formerly also important for liver oil, spiny dogfish is now targeted primarily for its meat.

3.1 National utilisation

Meat
Spiny dogfish meat is eaten in Europe, Australia, New Zealand, South America and Japan. It is consumed fresh, frozen or smoked. Markets favour mature females due to their larger size. In the UK, spiny dogfish is known as “rock salmon,” or “huss”. In Germany, meat is sold as “See-Aal” (sea eel) and belly flaps are smoked to make *Schillerlocken* (Rose 1996). The latter is a delicacy worth about EUR 48/kg in German supermarkets (Homes, V., *in litt*. to TRAFFIC Europe, 28 November 2003) compared to EUR 15/kg for *rock salmon* in the UK (internet, November 2003). In France, fresh meat is sold as *aiguillat commun* or *saumonette d’aiguillat* at about EUR 10/kg in French retail outlets in 1994 (Fleming and Papageorgiou, 1997), which remained stable until 2003 (Ringuet, S. pers. comm. to TRAFFIC Europe, November 2003). In the 1990s, Northeast US industry groups campaigned to create domestic demand for spiny dogfish under the more palatable name "cape shark" (Fordham in press).

Others
While spiny dogfish no longer retain their historical importance as a source of valuable liver oil for lighting and vitamin A, the oil is still utilised to some extent, likely mixed with that of other shark species. Spiny dogfish oil was used in the former Soviet Union (Fischer 1987). Fins may be utilised nationally in Japan but are of relatively low value because of their small size. The possible use of other parts and derivatives of spiny dogfish, such as cartilage, leather or curios (teeth or jaws) is not well documented or officially recorded and, if it occurs, it is of negligible importance compared with the utilisation of meat. A US assessment of the importance of recreational fishing for spiny dogfish concluded that this is not significant compared with commercial fishing (SARC 2003). Although more common in the past, Spanish fishermen still use sharkskin to polish and sand their boats (Rose 1996). Spiny dogfish heads are used as bait for other fisheries, in Morocco for instance (Fischer 1987).

3.2 Legal international trade

Meat
Special codes are used by customs services of the main importing countries to record international trade in meat of *Squalus acanthias* at species level. These codes are part of the customs Harmonised System, called Combined Nomenclature in the European Union (EU). The two specific codes are, 03026520 for ‘Fresh or chilled dogfish of the species *Squalus acanthias*‘ and 03037520 for ‘Frozen dogfish of the species *Squalus acanthias*’. Based on FAO and customs data (Eurostat import data and US customs export data), in 2001 the EU represented the world largest market for spiny dogfish meat, 65% at least of the world reported landings (Table 1a). Import prices for frozen spiny dogfish dropped by more than 50% from EUR 17/kg in 1995 to EUR 6/kg in 2002, while volumes rose from 450t to 1500t. France has been historically the largest consumer of spiny dogfish meat, importing an annual average of 5000t (98% spiny) from 1990-1994, with the UK as its top European supplier. At that time (1988-1994), Norway was the largest of nine non-EU suppliers of fresh or chilled spiny dogfish to the EU, followed by the US. In 2001, in addition to their 11,700t reported landings (wet weight), EU Member States imported 7100t spiny dogfish. From the total (18,800t), less than 1% was exported or re-exported. The largest proportion of ‘fresh or chilled’ and ‘frozen’ spiny dogfish imported into the EU in 2001 was destined to France (1500t), Germany (1400t), Denmark (1300t), the UK (1000t) and Italy (700t). USA (2700t –representing 92% of US reported landings), Canada (1950t – 23% of Canada’s reported landings) and Norway (1400t –98% of reported landings) supplied 75% of EU imports in 2001 (Figure 10). As European spiny dogfish stocks decline, demand is being met by imports from 25 countries, including emerging South American, African and Pacific suppliers (Table 5) such as Argentina, Mauritania and New Zealand, which exported to the EU only 5% of its 2001 reported landings (4200t). Discrepancies appeared between Argentina’s landings reported to FAO (Table 1b) and EU imports recorded in Eurostat (Table 5) for 2001 (ref. 2.4).

Japanese imports of fresh spiny dogfish dropped from 23t in 1986, to 60t in 1997, when the wholesale price was EUR 7.4/kg, or 3 times the value of any other fresh shark (Sonu 1998).

Fins

Among the 20 nations recorded by FAO as trading in spiny dogfish products, only Japan, New Zealand, South Africa and the United Kingdom reported exports of fins of this species. Also, Malaysia and Singapore did not include *Squalus acanthias* among shark species used for fins (Vannuccini, 1999). However, volumes of shark fins in international trade are generally lumped under a unique custom codes that does not allow to record the product at species level, data on global imports of spiny dogfish fins are not readily available.

Others
While fresh or frozen meat remains the most important commercial commodity, tails and fins are exported as well, e.g. from USA to China, Taiwan and Canada, cartilage and livers are exported from USA to France, Italy, Switzerland and Taiwan where they are used for medicinal purposes (ASMFC 2003). The species is also included in the list of sharks whose hides are processed into leather and from where livers are extracted (Vannuccini 1999). However, no reliable trade data are available, and according to past studies and surveys these products do not constitute the main markets for spiny dogfish parts and derivatives (Fleming and Papageorgiou 1997, Vannuccini 1999), which suggest that their use plays a less relevant role in spiny dogfish catch.

3.3 Illegal trade

In the absence of legally binding regulatory measures concerning catch or trade of spiny dogfish at national or international level, as it is the case for the largest majority of countries involved in shark catch and by-catch, no fishery activity or trade transaction is of illegal nature, including transhipment of spiny dogfish. Even in areas where directed shark fishing has been prohibited, such as in Alaska, related trade measures have not been adopted to restrict trade in products of shark by-catch, which therefore remains legal and unlimited and is composed in large proportions of spiny dogfish products.

3.4 Actual or potential impact of the trade

Since foreign markets are in most cases the driving economic force of spiny dogfish fisheries around the world (see 3.2, Figure 10; Table 5), unregulated international trade is the main potential source of threat to the species. The lack of adequate management of spiny dogfish stocks, particularly during the last century, coupled with a historical and stable market demand for its products, lead to a direct impact on the species populations. Fisheries that have caught the spiny dogfish as by-catch, and preliminary discarded species in the past, are now moving towards landing and exporting its valuable products.

3.5 Captive breeding for commercial purposes

Not economically viable, due to the slow reproductive and growth rates of this species.

4. Conservation and Management

4.1 Legal status

4.1.1. National

None. Although several range States (China, Greenland and Cyprus, *in litt.* to BfN, October and November 2003) recognise the occurrence of spiny dogfish in their fisheries by-catch, none have engaged in adopting the necessary national measures to limit or regulate this mortality and possible trade in its products. Some countries, for instance Sweden (E. Menhert, Swedish Board of Agriculture, *in litt*. to the German Ministry of Environment (BfN), 23 September 2003), are assessing the need to adopt special conservation measures for shark species such as spiny dogfish.

4.1.2. International

There are no international mechanisms in place for the conservation of spiny dogfish. The species is not listed on any international wildlife or fisheries agreement and has no international legal status. IUCN's Shark Specialist Group has a programme underway to assess and regularly reassess all

species of chondrichthyan fishes for the IUCN Red List, but not all regional populations of spiny dogfish have yet been assessed. The global assessment will be reviewed once this is done.

4.2 Species management.

4.2.1 Population monitoring

Population monitoring depends on routine monitoring of catches, collection of reliable data on the indicators of stock biomass and good knowledge of biology and ecology. In the case of spiny dogfish, relatively good landings data are available for the major fisheries, particularly in the Northeast Atlantic (Heessen 2003) and the Northwest Atlantic (ASMFC 2003, SARC 2003, NMFS 2003). Comprehensive commercial landings and research survey data have confirmed that these stocks are, as described above, seriously depleted. In most parts of the world, however, not only is there a lack of reporting on discards of spiny dogfish by-catch, for instance by bottom trawlers, but catch data for spiny dogfish, other sharks and rays are not recorded at species level. Scientists participating in the EU-funded DELASS project recommended that a higher priority must be given to the establishment of market sampling programs and observer programs, even in the Northeast Atlantic. The information from these programs will help to determine species compositions of elasmobranchs in catch and landing quantities, particularly where important data for stock assessments and population evaluation are missing (Heessen 2003).

4.2.2 Habitat conservation

No efforts have been made to identify and protect critical spiny dogfish habitat, although some are included in marine protected areas or static gear reserves and therefore protected from damage by bottom trawling.

4.2.3 Management measures

The International Plan of Action (IPOA) for the Conservation and Management of Sharks adopted by the FAO at the 23rd Session of the Conference on Fisheries (COFI) in February 1999 urges states with active shark fisheries to implement conservation and management plans. However, this initiative is voluntary and, although 116 countries reported shark landings for 2001 to FAO, members of FAO reported to the 25th session of COFI in February 2003 that only six countries had developed a National Plan of Action (NPOA) while a further 11 have partially developed a NPOA for sharks.

At the 12th meeting of the Conference of the Parties of CITES, it was reported (ref. Doc. 41.1 *Conservation and management of sharks*) that, despite significant landings of sharks and their products, progress on the implementation of the IPOA was negligible and that the NPOA-Sharks are not developing rapidly enough. The AC agreed at its 19th meeting (August 2003) to create an inter-sessional working group in order to better implement CITES Resolution Conf. 12.6 and associated Decisions, including a critical appraisal of progress with implementation of the FAO IPOA. A report on progress will be submitted to the 20th meeting of the Animals Committee.

Some Regional Fisheries Management Organisations (RFMOs) may potentially monitor or manage shark fisheries. Of these, the International Commission for the Conservation of Atlantic Tunas (ICCAT) has adopted specific resolutions, including *Resolution 95-2 –Cooperation with FAO to study status of stocks & shark by-catches*, to support improved management of shark stocks, including studies on shark by-catch. However, spiny dogfish was not included in the first round of species covered, which was limited to shortfin mako and blue sharks (ICCAT Resolution 01-11 *–Atlantic sharks*). Spiny dogfish is not recorded separately in the tables on Atlantic shark catch statistics last updated by ICCAT on 25 June 2001, and probably lumped within the category “Coastal sharks nei” (Excel file on http://www.iccat.es).

Northeast Atlantic

Sharks are fish species whose conservation falls within the domain of the European Common Fishery Policy (CFP) that is supposed to establish '…in the light of available scientific opinion, conservation measures necessary to ensure rational and responsible exploitation, on a sustainable basis, of living marine resources, taking account of, *inter alia*, the impact of fishing activities on the marine

ecosystem'. Holden (1968) first warned that part of the Northeast Atlantic stock was over-exploited, but it was not until 1988, that the first TAC was established for this species in the North Sea, a small part of European waters, based on historic landings, not on scientific advice. Total Allowable Catch (TAC –or annual catch quota) have consistently and massively exceeded North Sea landings. The European Commission‘s STECF (Scientific, Technical and Economic Committee for Fisheries) has since 1999 recommended a TAC for spiny dogfish fisheries in the European Community (EC) North Sea waters. In 1999, the TAC was set at 8870t (Table 3), which was paradoxically more than twice the total reported landings for the ICES North Sea area the year before, 3288t in 1998. In 2002, the TAC for EC waters was reduced by 36%, set at 7100t, with 81% of it (5745t) allocated to the UK. The basis for these catch quotas is unclear, since there were both much higher than the total North Sea (ICES areas IIIa, IV and Via and b –Figure 4) and UK reported landings for the previous year, 5700t and 1006t for 2001 respectively (Table 3). For 2003 the proposed TAC for EC North Sea waters was set at 5840t, 18% reduction compared to 2002, with 76% (4413t) allocated to the UK, which seems to remain inconsistent with both the total North Sea (1416t) and the UK (1013t) total reported landings in 2002, and of which the UK had landed only 24% of its 2003 quota in early December 2003 (Table 3).

Spiny dogfish has been included in a species list annexed to an agreement recently signed between the European Community, represented by the Commission, and the International Council for the Exploration of the Sea (ICES), with the objective of overcoming the lack of assessment of sharks (European Community 2001). In the European Commission's draft NPOA (2001), governments acknowledged that the management of elasmobranchs goes well beyond the European Community (EC) Common Fisheries Policy (CFP) and should be related to other environmental legislation and that this is a matter that needs to be addressed by the EU.

Norway manages its spiny dogfish fishery with a minimum landing size intended to protect mature females.

Northwest Atlantic management

In the Northwest Atlantic, spiny dogfish fisheries are managed by the Canadian and American government agencies. In Eastern Canada, the first quota and management measures for spiny dogfish were put in place in 2002. The first US management plan specifically for spiny dogfish was developed in the late 1990s by the Mid-Atlantic and New England Fishery Management Councils, and took effect in 2000, in response to a decade of intense unregulated fishing (Bonfil 1999). The National Marine Fisheries Service (NMFS) has imposed low, science-based trip limits and quotas ever since, but federal management measures are not compulsory in state waters and directed fishing is continuing at unsustainable levels nearshore, particularly in Massachusetts. The Atlantic States Marine Fisheries Commission (ASMFC), whose spiny dogfish plan mirrors that in federal waters on paper, this year ignored the scientific advice and adopted state spiny dogfish trip limits in excess of the limits suggested by the NMFS. In response NMFS shut down spiny dogfish fishing in federal waters in early 2003 (The Ocean Conservancy, August 2003).

The first quota set in the Canadian Maritimes Region (Eastern Canada, Northwest Atlantic), was a cap of 2500t in 2001. That limit was exceeded by 1000t. In 2002, the Department of Fisheries and Oceans (DFO) Canada set a cap again at 2500t, with allocations to fishing communities/stakeholders based on their prior catches. The quota was allocated to the fixed gear fleet of vessels less than 45 feet. All other fleets were limited to a bycatch amount of spiny dogfish consistent with historic landings. The community quotas were expected to be maintained in 2003, but with a provision to stop quota overruns (Fordham 2003b).

Northeast Pacific

British Columbia spiny dogfish have been broadly managed through groundfish regulations since 1978. Spiny dogfish are subject to TACs that have not yet been reached. Discards are difficult to estimate due to misreporting and lack of observers (Bonfil 1999).

Spiny dogfish fisheries in the US North Pacific receive minimal management. Off Alaska, they are the predominant shark taken and are regulated under an “other species” TAC (Alaska NMFS report 2000). Washington includes spiny dogfish in bottomfish management plans, but there are few species-specific measures. The directed fishery is subject to mesh restrictions but not quotas. Although the USA and Canada conduct cooperative surveys for Northeast Pacific spiny dogfish, there is no coordinated, international management for the stock (Camhi 1999).

Northwest Pacific
Currently no catch control for management of sharks is being enforced by Regional Fisheries Management Organisations, which focus on tuna. Depending on the results of stock assessment, however, there is a possibility that catch control will be introduced for conservation and management of sharks in the future. Further, in response to FAO's call for development of national plans of action for conservation and management of shark stocks, Japan has developed its national plan of action with framework to monitor the state of sharks in Japan, and will recommend, when necessary, to introduce measures for conservation and management of the shark resources [Ref. CITES AC19 Doc. 18.3 *Biological and trade status of sharks (Resolution Conf. 12.6 and Decision 12.47)*].

Southern hemisphere
New Zealand is the only country where management is being introduced to limit catches to current sustainable levels. This anticipates the expansion of the spiny dogfish fishery to meet European demand for the meat (Fordham in press).

4.3 Control measures

4.3.1 International trade

At present the international trade regulations concerning trade controls of spiny dogfish are almost non-existent and are limited to either to the usual sanitary measures for fishery products and to import duties (tariffs), which are for instance 6% in the EU. The latter explains why the only tool available to monitor exports and imports of spiny dogfish products was set up, namely the specific customs codes for frozen and fresh or chilled spiny dogfish (see 3.2). However, these codes are used by customs services on voluntary basis. While in the EU, spiny dogfish codes are used for economical reasons; in Japan for instance import of frozen spiny dogfish is lumped with other shark products under a less specific code, No. 0303 7500, which does not allow to estimate the level of trade at species level.

4.3.2 Domestic measures

None. Even where spiny dogfish catch quotas have been established, such as in some countries of the Northeast Atlantic, no particular legal trade measures have been adopted to prevent the sale or export of spiny dogfish landings in excess to the quota.

5. Information on Similar Species

The genus *Squalus*, characterised by the absence of an anal fin and the presence of two dorsal fins, each preceded by a sharp spine, is currently under review (Compagno in preparation). The spiny dogfish *Squalus acanthias* is one of the only members of this genus that poses no taxonomic problems, being identified by the location of the first dorsal fin behind or sometimes over the pectoral fin free rear tips and the spine origin well behind the pectoral free rear tips, usually with white spots on the side of the body (Compagno 1984). The former suggestion of the existence of two sub-species is not longer accepted due to the considerable overlap between morphometric ratios and vertebral counts (Al-Badri & Lawson 1985 in Heessen 2003). In contrast, it is uncertain how many species occur within the other two main species groups of *Squalus* (Compagno in preparation), some of which have an overlapping distribution with *S. acanthias*.

With regard to meat, the product most commonly traded for this species, in Europe spiny dogfish is found in the same processing and retail markets as catsharks *Scyliorhinus* spp. and smooth-hounds *Mustelus* spp., although the former is marketed in the north and the latter in the south of Europe.

Several recent studies on shark DNA show promising perspectives for elasmobranch species identification (Chapman *et al*. 2003, Hoelzel 2001) as well as for the rapid assessment of intra-specific variation, such as sub-species or population differentiation and structure (Keeney and Heist 2003, Stoner *et al*. 2002). There is high potential for the application of these techniques to other species, such as spiny dogfish, for which samples have already been collected from Northeast and Northwest Atlantic specimens (Heessen 2003). DNA testing for the identification of spiny dogfish meat, as well as other products less relevant to international trade, could soon be developed (Dr Arne Ludwig,

Institute for Zoo and Wildlife Research, Department of Evolutionary Genetics (Berlin), pers comm. to TRAFFIC Europe, November 2003). A research proposal to sequence the genome of spiny dogfish *Squalus acanthias* is being jointly developed by Mound Desert Island Biological Laboratory (MDIBL) and the Washington University Genome Sequencing Centre (*in litt*., 7 December 2003).

6. Other comments

In response to a preliminary consultation undertaken by the relevant German government agency (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit) on the initiative to draft a proposal for the inclusion of spiny dogfish in Appendix II of CITES, seven countries provided their opinion and/or input. Two clearly stated their support to this initiative and one indicated that it would not be supportive of such proposal. Among the four remaining responses, while two did not express their opinion on the conservation status of the species, the two other countries recognised the need for improved conservation measures, such as including spiny dogfish *Squalus acanthias* in their national red list.

7. Additional remarks

7.1 Assessment of spiny dogfish under the CITES biological criteria

This proposal for the listing of spiny dogfish on Appendix II of CITES is based on the following assessment of the species biological status, using CITES Appendix II criterion B (i) and (ii) (Ref. AC19 Doc. 9: "*B. It is known, or can be inferred or projected, that harvesting of specimens from the wild for international trade has, or may have, a detrimental impact on the species by either i) exceeding, over an extended period, the level that can be continued in perpetuity; or ii) reducing it to a population level at which its survival would be threatened by other influences*.").

a. The species has been subjected to unsustainable fisheries in several parts of its range.
b. A large proportion of the products of these fisheries was destined for and has entered international trade.
c. In recent years, the Northeast and Northwest Atlantic spiny dogfish fisheries have largely been supported by the high demand for spiny dogfish in Europe. The depletion of these two stocks and the existing constant demand have, since the late 1980s, caused increasing fishing pressure on South Atlantic and Pacific stocks (Figures 6 to 9).

7.2 Assessment of the spiny dogfish under FAO's recommended criteria for CITES listing

The United Nations Food and Agriculture Organisation (FAO) has carefully considered the application of the CITES listing criteria to commercially exploited aquatic species through a series of technical consultations. FAO (2000) notes that large, long-lived, late-maturing species, with both high and low fecundity, but more so the latter, are at a relatively high risk of extinction from exploitation. Productivity, as a surrogate for resilience to exploitation, was considered to be the single most important consideration when assessing population status and vulnerability to fisheries. The most vulnerable species are those with an intrinsic rate of population increase of <0.14 and a generation time of >10 years (FAO 2001). Life history data presented in section 2.4 indicate that the spiny dogfish falls into FAO's lowest productivity category and, as such, could qualify for consideration for Appendix I listing if their population declined to 20% or less of the historic baseline (FAO, 2001). FAO (2001) further recommend that even if a species is no longer declining, if populations have been reduced to near the extent-of-decline-guidelines (defined as from 5-10% above the Appendix I extent of decline), they could be considered for Appendix II listing. The declines described for several spiny dogfish fisheries are taken as an indicator of declining population size to 5-10% of historic baseline.

7.3 CITES Provisions under Article IV, paragraphs 6 and 7: *Introduction form the sea*

This provision does not apply to spiny dogfish catch, which occurs within countries EEZ and will therefore not involve introduction of specimens from offshore fishing grounds.

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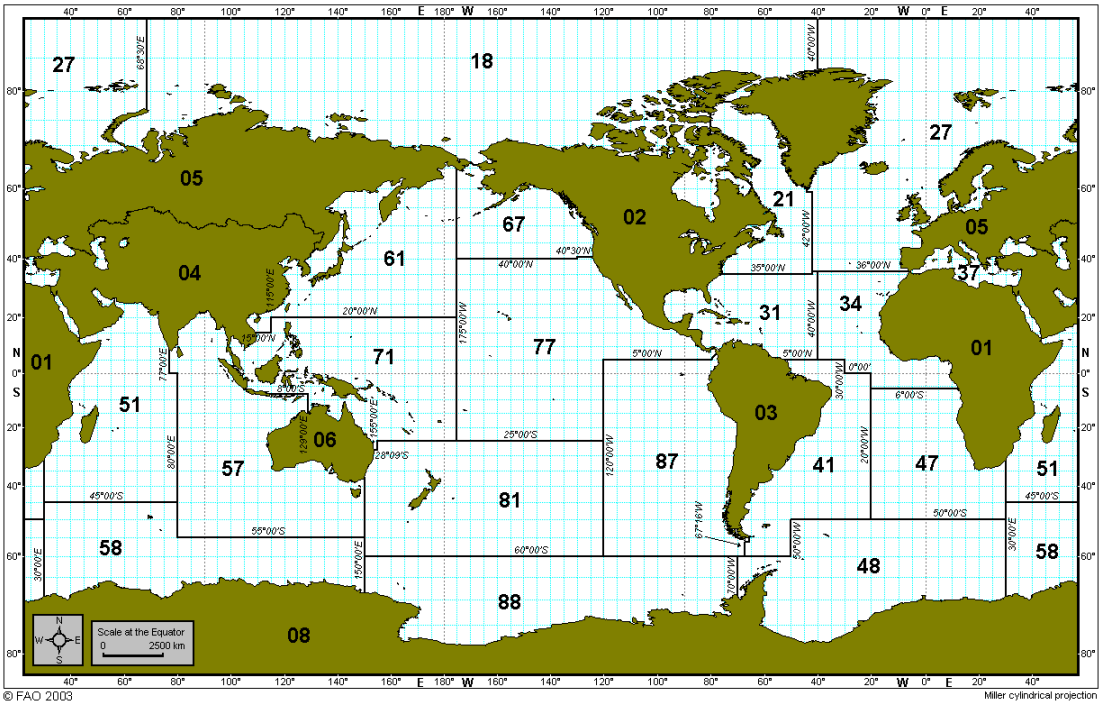

Figure 3. FAO fishing areas.

Spiny dogfish catches are mostly taken in the Atlantic Northeast: Area 27.

01 - Africa-Inland Water
02 - America-Inland Water
03 - America, South-Inland Water
04 - Asia-Inland Water
05 - Europe-Inland Water
06 - Oceania-Inland Water
21 - Atlantic, Northwest
27 - Atlantic, Northeast
31 - Atlantic, Western Central
34 - Atlantic, Eastern Central
37 - Mediterranean & Black seas
41 - Atlantic, Southwest
47 - Atlantic, Southeast
48 - Atlantic, Antarctic
51 - Indian Ocean, Western
57 - Indian Ocean, Eastern
58 - Indian Ocean, Antarctic
61 - Pacific, Northwest
67 - Pacific, Northeast
71 - Pacific, Western Central
77 - Pacific, Eastern Central
81 - Pacific, Southwest
87 - Pacific, Southeast
88 - Pacific, Antarctic

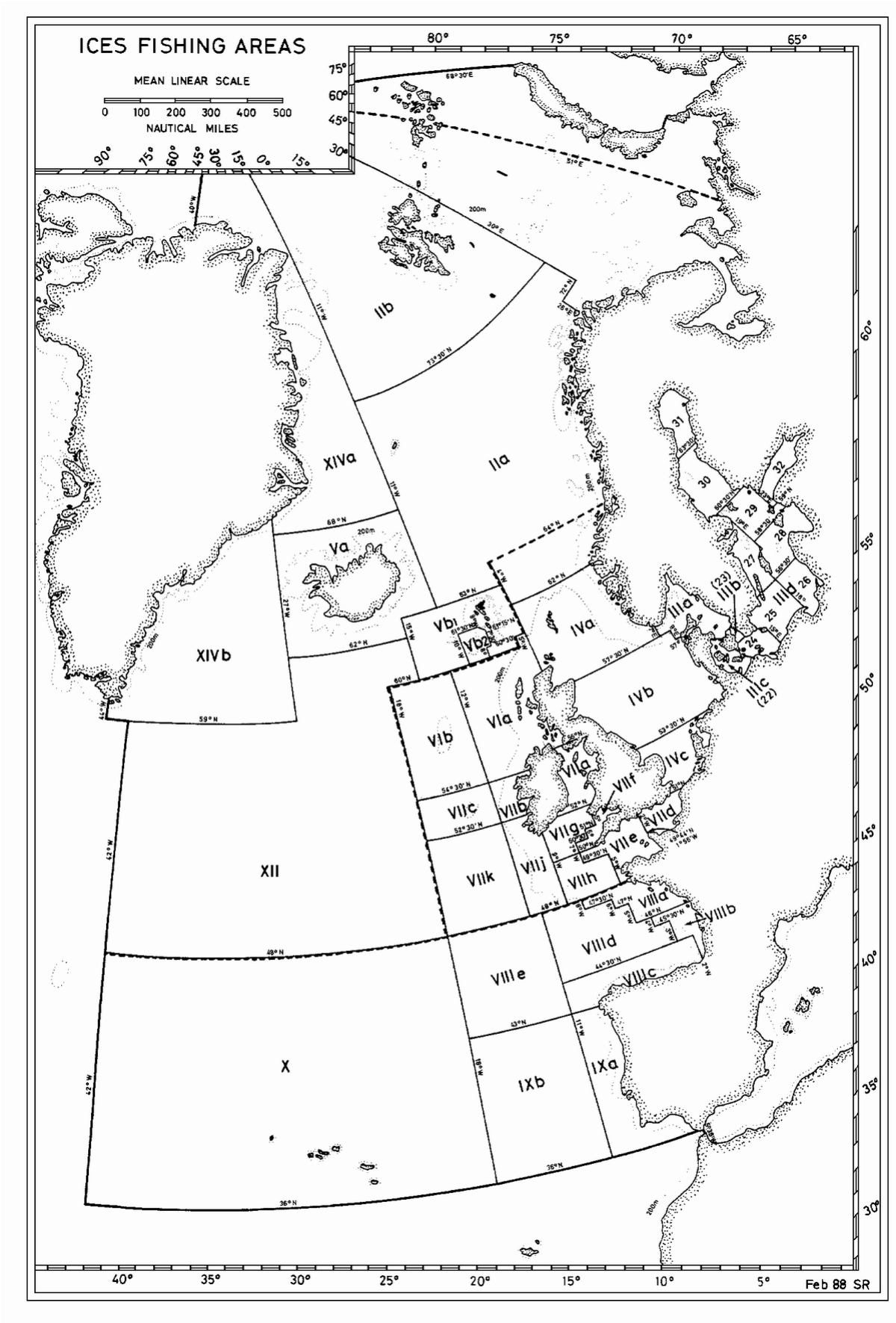

Figure 4. ICES fishing areas in the Atlantic Northeast.

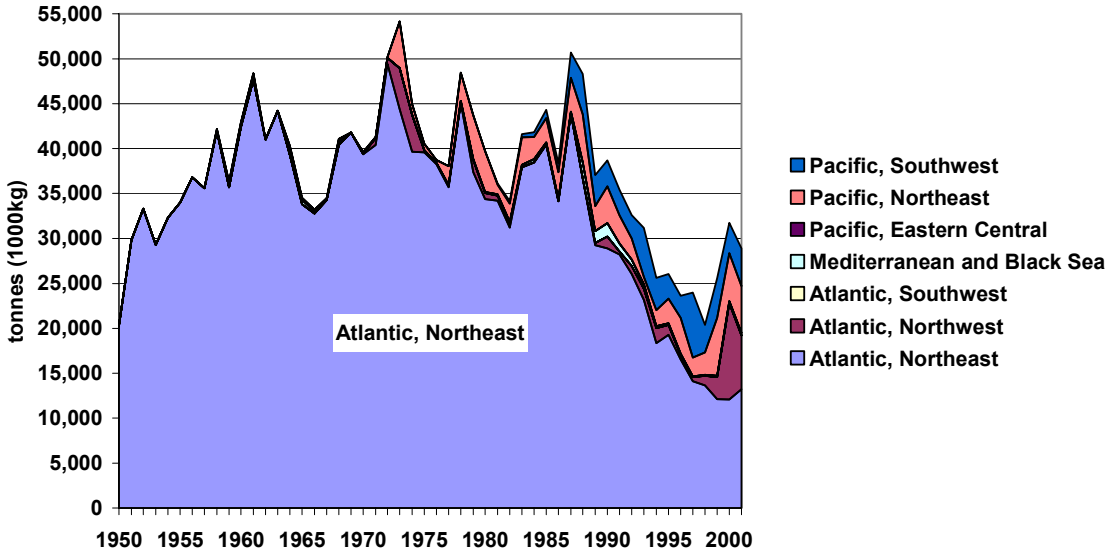

Figure 5. Landings of spiny dogfish (*Squalus acanthias*) (tonnes) reported by FAO fishing area from 1950 to 2001
(*Source*: FAO via Fishbase).

Table 1. Landings of spiny dogfish (*Squalus acanthias*) (tonnes) by FAO fishing area
(*Source*: FAO via Fishbase).

a) From 1992 to 2001

Area	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Atlantic, Northeast	26,040	23,155	18,334	19,281	16,508	14,102	13,634	12,098	12,092	13,228
Atlantic, Northwest	880	1,272	1,691	1,086	495	454	1,082	2,456	10,702	5,996
Atlantic, Southwest	0	0	0	0	0	0	0	0	0	0
Mediterranean & Black seas	727	485	213	182	144	96	97	143	204	287
Pacific, Eastern Central	1	3	1	1	0	1	5	24	8	3
Pacific, Northeast	2,356	830	1,776	2,744	4,000	2,100	2,501	6,439	5,363	5,181
Pacific, Southwest	2,592	5,429	3,601	2,753	2,477	7,232	3,064	4,409	3,362	4,192
TOTAL	**32,596**	**31,174**	**25,616**	**26,047**	**23,624**	**23,985**	**20,383**	**25,569**	**31,731**	**28,887**

b) From 1950 to 2001

FAO Area	No. of fishing countries	Total catch (tonnes)	% of world total catch	2001 catch as % of period peak
Atlantic, Northeast	16	1 722 318	89%	**27%**
Atlantic, Northwest	8	42 003	2%	56%
Atlantic, Southwest	1	1	0%	0%
Mediterranean & Black seas	7	11 262	1%	16%
Pacific, Eastern Central	1	116	0%	12%
Pacific, Northeast	3	92 945	5%	**80%**
Pacific, Southwest	1	58 862	3%	58%
Total	**37**	1 927 507	100%	53%

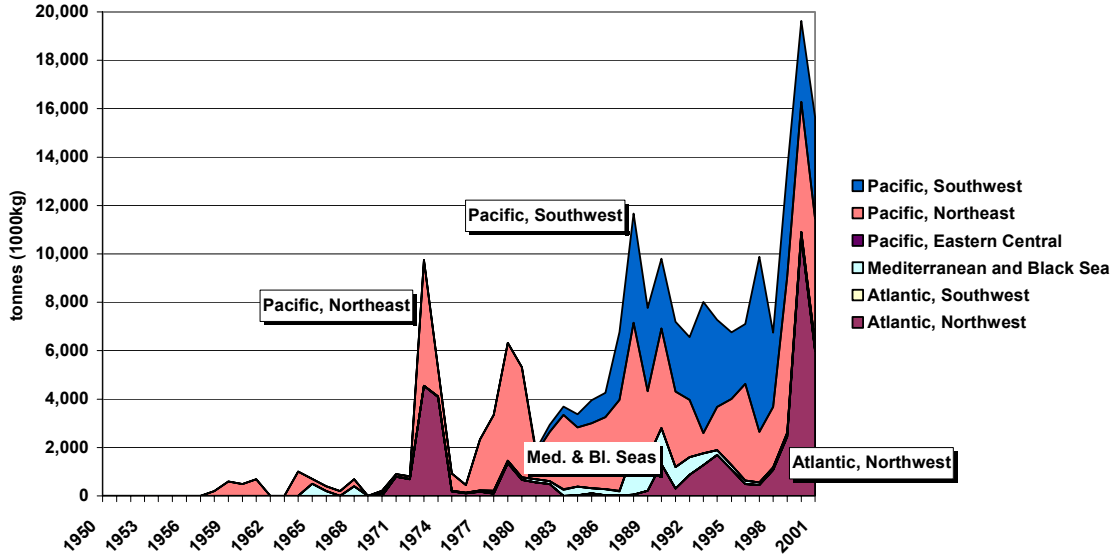

Figure 6. Landings of spiny dogfish (*Squalus acanthias*) (tonnes) by FAO fishing area, excluding the Atlantic Northeast
(*Source*: FAO via Fishbase).

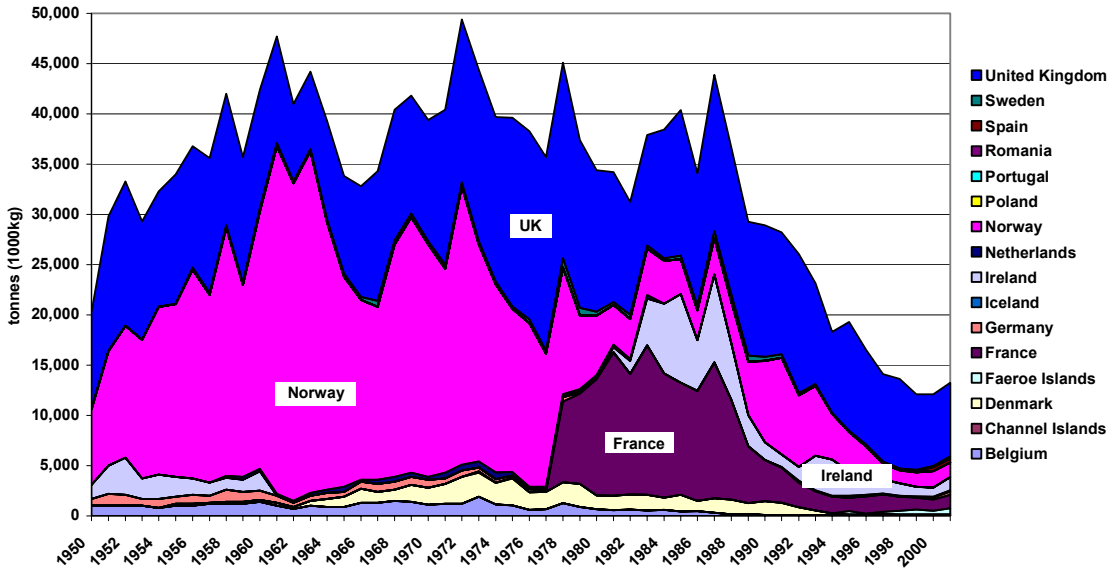

Figure 7. Landings of spiny dogfish (*Squalus acanthias*) (tonnes) by country in the Atlantic Northeast, from 1950 to 2001
(*Source*: FAO via Fishbase).

Table 2. Landings of spiny dogfish (*Squalus acanthias*) (tonnes) reported to FAO, by country in the Northeast Atlantic. (*Source*: FAO via Fishbase).

a) From 1992 to 2001

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Belgium	56	47	21	14	16	15	17	10	11	13
Denmark	800	486	211	146	142	196	126	131	146	156
Faeroe Islands	0	0	0	308	51	212	356	484	354	613
France	2,406	1,911	1,661	1,349	1,719	1,708	1,410	1,192	1,097	1,333
Germany	56	8	0	0	0	0	0	45	188	303
Iceland	181	109	97	166	157	106	78	57	109	136
Ireland	1,383	3,424	3,624	2,435	2,095	1,407	1,259	962	880	1,301
Netherlands	0	0	0	0	0	0	0	0	28	39
Norway	7,114	6,945	4,546	3,939	2,749	1,567	1,293	1,461	1,643	1,424
Spain	0	0	0	0	0	1	27	94	372	363
Sweden	230	188	95	104	154	197	140	114	124	238
United Kingdom	13,812	10,032	8,072	10,815	9,423	8,691	8,926	7,527	7,138	7,306
TOTAL	**26,038**	**23,150**	**18,327**	**19,276**	**16,506**	**14,100**	**13,632**	**12,077**	**12,090**	**13,225**

b) From 1950 to 2001

Country	Total catch (tonnes)	% of regional total catch	2001 catch as % of period peak
Belgium	37 713	2%	1%
Denmark	49 575	3%	6%
Faeroe Islands	2 591	0%	100%
France	156 456	9%	9%
Germany	20 505	1%	25%
Iceland	1506	0%	75%
Ireland	88 202	5%	15%
Netherlands	8 871	1%	6%
Norway	689 751	40%	**4%**
Spain	857	0%	98%
Sweden	15 329	1%	25%
United Kingdom	650 889	38%	38%
Total	**1 722 318**	100%	**27%**

Figure 8. Total landings reported of spiny dogfish (*Squalus acanthias*) (tonnes) by ICES fishing area, in the Northeast Atlantic, from 1906 to 2002, excluding areas with negligible catches (I, IX, X, XII and XIV)

(*Sources*: 1906-1972 from Heessen, 2003; 1973-2002 from ICES Statlant Fisheries Statistics Database, November 2003).

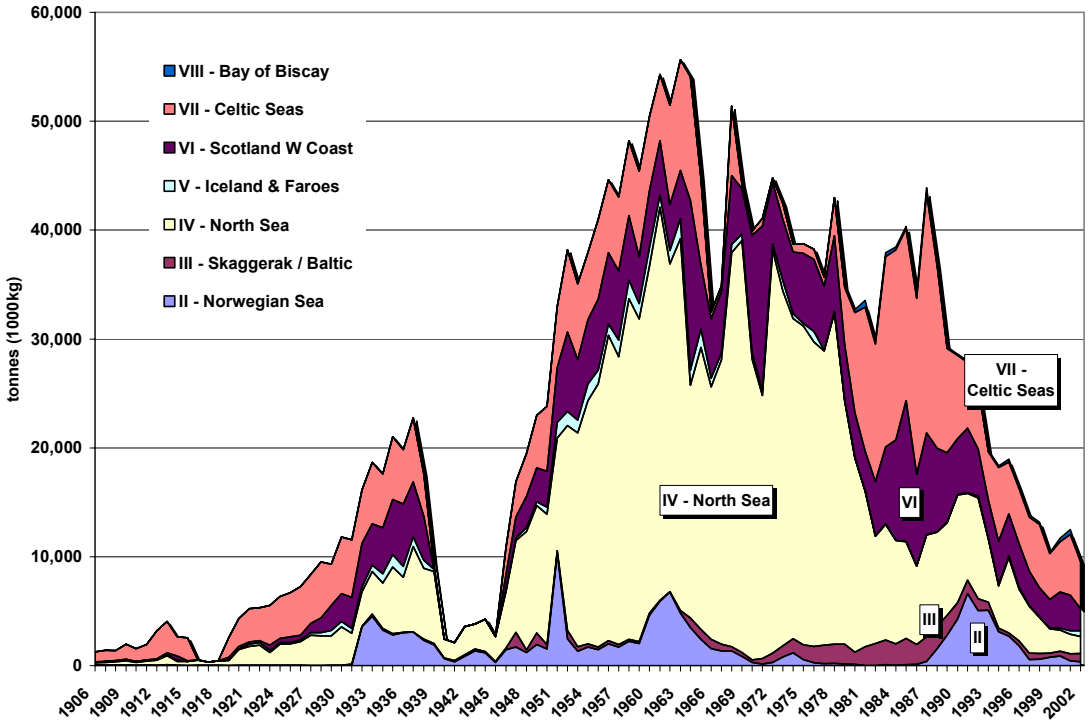

Table 3. Comparison between total reported landing and quotas for spiny dogfish in the European Community (EC) and UK North Sea waters* (tonnes)

	1999			2000			2001			2002			2003	2004
	Total reported landings*	Quota in EC North Sea waters	Quota as % of reported landings	Total reported landings*	Quota in EC North Sea waters	Quota as % of reported landings	Total reported landings*	Quota in EC North Sea waters	Quota as % of reported landings	Total reported landings*	Quota in EC North Sea waters	Quota as % of reported landings	EC North Sea Quota	EC North Sea Quota**
North Sea waters	5,262	8,870	169%	5,705	8,870	155%	5,702	8,870	156%	3,313	7,100	214%	5,840	4,472
UK	1,653	7,177	434%	1,291	7,177	556%	1,006	7,177	713%	1,013	5,745	567%	4,413	3,617
UK as % to EC		81%			81%			81%			81%		76%	81%

* ICES areas IIIa, IV and VIa and b
** Proposed quota, still to be adopted, for 2004

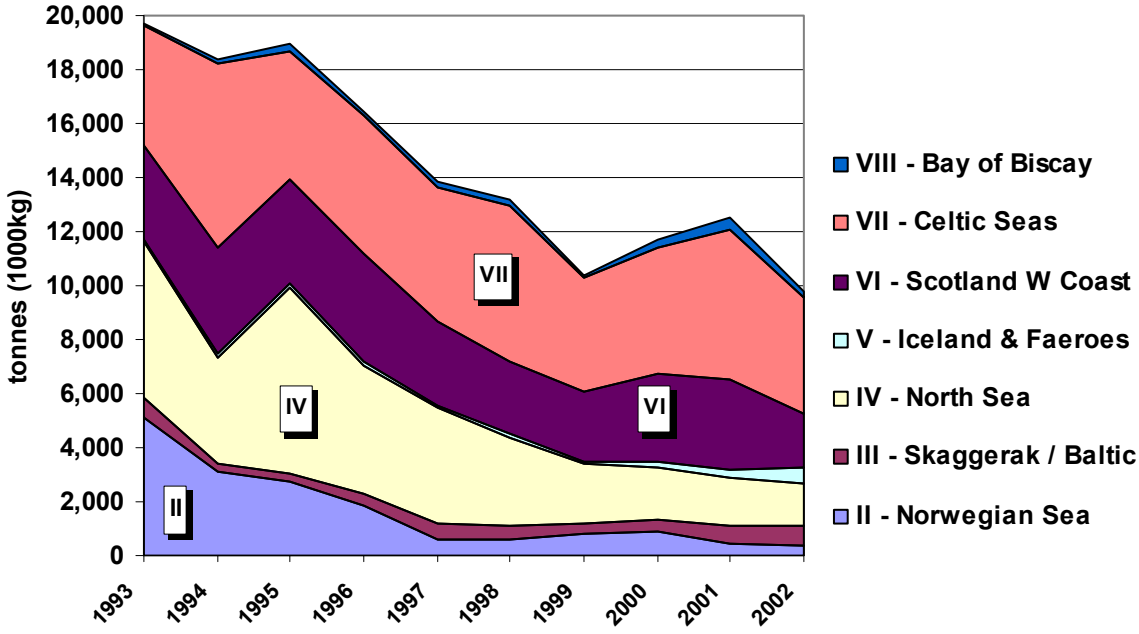

Figure 9. Total landings of spiny dogfish (*Squalus acanthias*) (tonnes) by ICES fishing areas, in the Northeast Atlantic region, from 1980 to 2002
(*Sources*: ICES Statlant Fisheries Statistics Database, November 2003).

Table 4. Total landings of *Squalus acanthias* by combined ICES fishing areas (tonnes)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
II - Norwegian Sea	5,102	3,123	2,725	1,853	581	607	779	894	461	356
III - Skaggerak / Baltic	735	315	292	421	598	510	393	433	639	762
IV - North Sea	5,771	3,907	6,908	4,745	4,269	3,290	2,227	1,954	1,796	1,568
V - Iceland & Faeroes	110	102	167	167	107	81	58	172	307	541
VI - Scotland W Coast	3,482	3,983	3,847	4,027	3,129	2,670	2,648	3,317	3,284	2,001
VII - Celtic Seas	4,451	6,767	4,762	5,047	4,947	5,807	4,176	4,608	5,581	4,357
VIII - Bay of Biscay	74	151	264	194	240	208	98	327	431	212
IX - XIV - Portugal & Atlantic	6	7	9	2	14	106	43	34	116	2
TOTAL	**19,731**	**18,355**	**18,975**	**16,456**	**13,886**	**13,279**	**10,422**	**11,738**	**12,615**	**9,799**

(*Sources*: ICES Statlant Fisheries Statistics Database, November 2003).

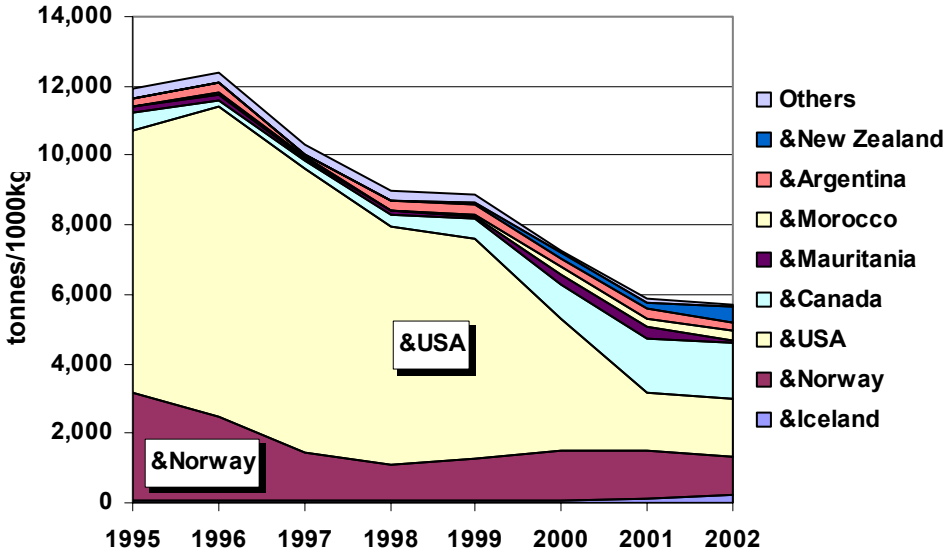

Figure 10. Origin of EU imports* of fresh or chilled (CN Code: 0302 6520) and frozen (CN Code: 0303 7520) 'Dogfish of the species *Squalus acanthias*'
(*Source*: Eurostat 2003)

* Excluding EU Member States, such as Germany –one of the main EU importer (ref. 3.2), that do not use the special CN codes for recording 'Dogfish' products separately, and lump them with all other shark species under a more general code, e.g. 0303 7500, as does Japan.

Table 5. Countries supplying spiny dogfish to the EU (tonnes)

	1995	1996	1997	1998	1999	2000	2001	2002
&Iceland	30.50	72.50	66.60	47.70	31.90	70.40	107.20	220.80
&Norway	3,132.10	2,415.90	1,393.90	1,064.50	1,238.70	1,446.70	1,395.70	1,107.60
&USA	7,581.20	8,938.30	8,181.20	6,817.40	6,316.60	3,760.90	1,670.70	1,664.10
&Canada	469.20	144.90	227.50	370.20	598.90	1,003.40	1,568.70	1,610.00
&Morocco	25.00	17.20	30.90	32.10	50.70	216.50	231.50	247.50
&Mauritania	167.90	205.60	52.00	90.40	65.60	291.90	304.70	90.50
&Argentina	204.40	312.70	68.00	255.70	253.30	231.70	309.80	262.70
&New Zealand	28.80	5.40	18.00	15.20	71.00	151.70	194.60	448.20
Others	286.50	294.30	280.60	279.40	260.80	95.00	80.00	64.00
Total	**11,925.60**	**12,406.80**	**10,318.70**	**8,972.60**	**8,887.50**	**7,268.20**	**5,862.90**	**5,715.40**

(*Source*: Eurostat, 2003)

Annex 1.

Scientific synonyms of *Squalus acanthias*

(*Source*: FAO Species Identification Sheet, 2003)

- *Squalus spinax* Olivius, 1780 (not Linnaeus, 1758 = *Etmopterus spinax*);
- *Squalus fernandinus* Molina, 1782;
- *Acanthias antiguorum* Leach, 1818;
- *Acanthias vulgaris* Risso, 1826;
- *Acanthias americanus* Storer, 1846;
- *Spinax mediterraneus* Gistel, 1848;
- *Spinax (Acanthias) suckleyi* Girard, 1854;
- *Acanthias sucklii* Girard, 1858 (error for suckleyi ?);
- *Acanthias linnei* Malm, 1877;
- *Acanthias lebruni* Vaillant, 1888;
- *Acanthias commun* Navarette, 1898;
- *Squalus mitsukurii* Tanaka, 1917 (not Jordan & Fowler, 1903);
- *Squalus wakiyae* Tanaka, 1918;
- *Squalus kirki* Phillipps, 1931;
- *Squalus whitleyi* Phillipps, 1931;
- *Squalus barbouri* Howell-Rivero, 1936.