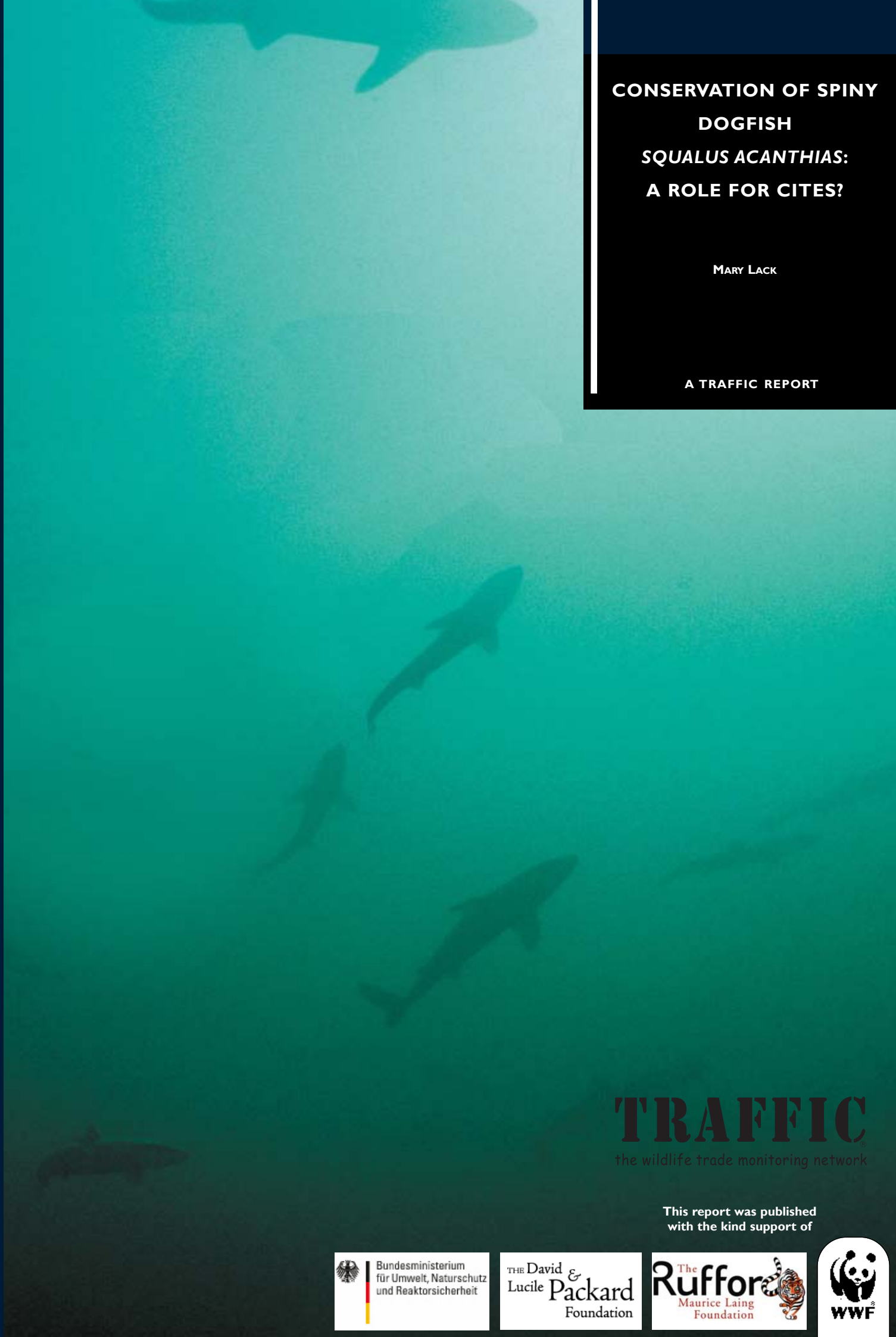

CONSERVATION OF SPINY DOGFISH *SQUALUS ACANTHIAS*: A ROLE FOR CITES?

MARY LACK

A TRAFFIC REPORT

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Front cover photograph: Spiny Dogfish *Squalus acanthias*, eastern Pacific Ocean.

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by Mary Lack

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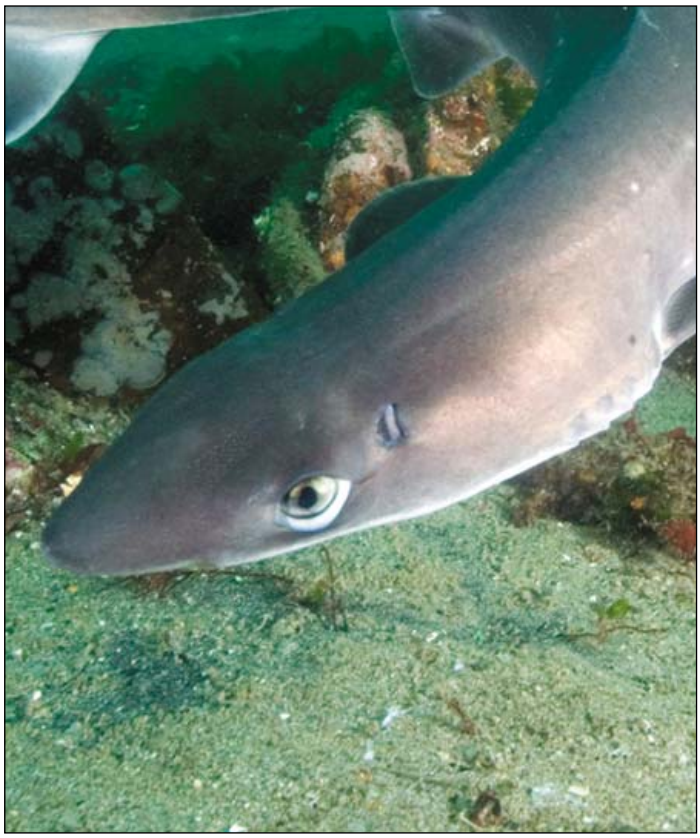

Credit: © Andy Murch/SeaPics.com

Spiny Dogfish *Squalus acanthias*, British Columbia, Pacific Ocean.

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INTRODUCTION

Many species of shark are inherently vulnerable to over-exploitation owing to their late maturity, longevity and low fecundity. This vulnerability and the declining status of many shark[1] stocks worldwide have been widely recognized. In 1994, the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) recognized the vulnerability and unsustainable exploitation of some shark species and the lack of monitoring of international trade of shark products (*Resolution Conf. 9.17*)[2]. In 1999, the *International Plan of Action for the Conservation and Management of Sharks* (FAO, 2000) was adopted. However, implementation of the Plan has been patchy and there has been little discernible progress in arresting the decline in shark stocks or improving the quality and availability of data on shark catch. Between 1990 and 2003, reported shark catch increased by 20% and exports of shark products doubled (Lack and Sant, 2006). These estimates are, however, likely to underestimate shark catches significantly, as they are based on incomplete catch data, take no account of shark mortality arising from discards and, in relation to trade, do not necessarily reflect all shark products traded.

Concern for the conservation of some shark species has resulted in three species being listed in the Appendices of CITES. In 2002, CITES Parties listed Whale Shark *Rhincodon typus* and Basking Shark *Cetorhinus maximus* in Appendix II of the Convention and in 2004 added Great White Shark *Carcharodon carcharias* to that Appendix. CITES Parties have made a number of additional decisions relating to shark species. These include *Decision 13.42* which requires, among other things, that the Parties ensure that international trade is not detrimental to the status of a range of specified shark species, including Spiny Dogfish *Squalus acanthias*[3].

In 2004, the German Government prepared a draft proposal to include Spiny Dogfish in Appendix II of CITES. An Appendix-II listing does not necessarily restrict trade in the species, but where trade occurs it must be determined not to be detrimental to the survival of the species. The CITES Animals Committee considered the proposal and most members agreed that the species appeared to meet the biological criteria for an Appendix-II listing (CITES Animals Committee, 2004). However, Germany's proposal did not receive the required level of support from European Union (EU) co-members and therefore was not submitted for consideration by the thirteenth meeting of the Conference of the Parties to CITES (CoP13), in 2004. In 2006, the German Government prepared a revised proposal (Anon., 2006) which, if supported by the required number of EU votes, is intended to be submitted for consideration at the fourteenth meeting of the Conference of the Parties to CITES (CoP14), in June 2007.

To date, no marine species taken in a large-scale, industrial, commercial fishery has been listed under CITES. However, understanding of the issues associated with the application of CITES to marine species has increased significantly in recent years. Experience has been gained from the listing of a number of extensively traded aquatic species. These include Queen Conch *Strombus gigas*, giant clams Family Tridacnidae, all hard corals, seahorses in the genus *Hippocampus*, all sturgeon and paddlefish Order Acipenseriformes, Humphead Wrasse *Cheilinus undulatus* and, as noted above, three shark species. In addition, the body of literature

available on the application of CITES to marine species is increasing (see for example, Willock (2002), Sant (2004) and Willock *et al*. (2004)). This report adds to that body of knowledge by examining the potential conservation benefits which an Appendix-II listing might offer to a species such as Spiny Dogfish, which is caught in an industrial fishery and traded in large quantities.

PURPOSE

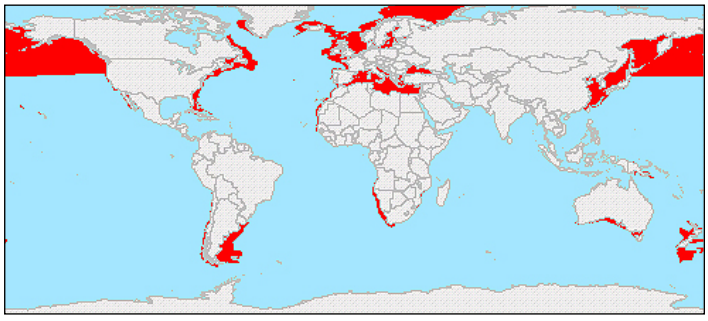
This report examines the characteristics of the fisheries for and trade in Spiny Dogfish and, based on those characteristics, assesses the issues surrounding the implementation of an Appendix-II listing and the benefits a listing may provide to the conservation of the species. Specifically, the report:

- provides an overview of the biology of and fisheries for Spiny Dogfish, of the status of stocks and of the management and trade of the species;
- outlines the CITES provisions for an Appendix-II listing;
- identifies and analyses the nature and extent of the issues associated with listing Spiny Dogfish in Appendix II of CITES;
- assesses the extent to which these issues pose a constraint to the effectiveness of a listing of Spiny Dogfish*;*
- examines the potential benefits arising from a listing of Spiny Dogfish in Appendix II; and
- makes recommendations to maximize the effectiveness of an Appendix-II listing.

BIOLOGY AND DISTRIBUTION OF SPINY DOGFISH[4]

The Spiny Dogfish is a small, demersal shark found mainly in temperate continental shelf seas. The species is widely distributed (see **Figure 1**) in both the northern and southern hemispheres. Sixty-five range States have been identified and Spiny Dogfish has been recorded as taken in 13 of the 19 Fisheries Areas[5] designated by the Food and Agriculture Organization of the United Nations (FAO). Sub-populations have been identified in the Northwest Atlantic, Northeast Atlantic, the Mediterranean and Black Sea, the Northeast Pacific, the Northwest Pacific, Australasia (Southwest Pacific), South America and Southern Africa (IUCN, 2006).

Figure 1
Distribution of Spiny Dogfish



Source: FAO Species Identification and Data Programme, 2006a.

Spiny Dogfish are generally found in large schools just above the seabed, but do move through the water column on the continental shelf. While they have been recorded to depths of 900 m (Compagno, 1984) they are most commonly found between 10 and 200 m (McEachran and Brandstetter, 1989).

A summary of the life history parameters of Spiny Dogfish is provided in **Table 1**. Despite its widespread distribution and natural abundance, Spiny Dogfish is one of the more vulnerable shark species owing to its late maturity, relatively low reproductive capacity, high longevity and long generation time (IUCN, 2006). These characteristics, together with its aggregating habit and segregation of populations by size and sex, make schools of large pregnant females particularly vulnerable to fishing and the species susceptible to stock collapse through over-fishing.

Table 1
Spiny Dogfish life history parameters

Age at maturity (years)	female: male:	12 (NW Atlantic); 23 (NE Pacific); 15 (NE Atlantic) 6 (NW Atlantic); 14 (NE Pacific)
Size at maturity (total length cm)	female: male:	75 (NW Atlantic); 93.5 (NE Pacific); 83 (NE Atlantic); 70–100 (Med.) 60 (NW Atlantic); 59 (Australia); 59–72 (Med.)
Longevity (years)	female: male:	40–50 (NW Atlantic); >60 yrs (NW Pacific), or up to 100 years 35 (NW Atlantic)
Maximum size (total length cm)	female: male:	110–124 (N Atlantic); 130–160 (N Pacific); 200 (Med.), 111 (NZ) 83–100 (N Atlantic); 100–107 (N Pacific); 90 (NZ)
Size at birth (cm)		18–33
Reproductive age (average)		Unknown, but over 25 years; 40 years in NE Pacific
Gestation time		18–22 months
Reproductive periodicity		Biennial (no resting stage, litters are born every two years)
Average litter size		1–20 pups (2–15 NW Atlantic; 2–11 Med.), increases with size of female
Annual rate pop'n increase		2.3 % (N Pacific); 4–7% (NE Atlantic)
Natural mortality		0.092 (NW Atlantic); 0.1 (0.3 for very old/young fish) (NE Atlantic)

Source: Various sources as summarized by Anon., 2006.

FISHERIES AND STOCK STATUS

Global catch

The main catches of Spiny Dogfish have historically been in the Northeast Atlantic, the Northwest Atlantic, and the Northeast, Northwest and Southwest Pacific. In the Northeast Atlantic, annual catch peaked at around 50 000 t in 1972 (FAO, 2006b) but had declined to around 8000 t by 2004 owing to declines in catch rates and the imposition of catch limits in some fisheries. Between 1950 and 1972, catch from the Northeast Atlantic accounted for between 97 and 100% of the global reported catch. This region continued to account for around 90% of the global catch until the mid-1980s. Since that time, the region's share has declined, with the downward trend most evident since the mid-1990s (see **Table 2**). In 2004, catch from that stock accounted for only 39% of the global catch of 20 500 t. FAO data indicate that the Northwest Atlantic and Southwest and Northeast Pacific have become relatively more important sources of Spiny Dogfish catch as a percentage of the global catch, but the data do not include the Japanese fishery in the Northwest Pacific. While Japanese sources indicate that extensive catches of Spiny Dogfish were taken in that area in the early part of the 20th century, catches have declined markedly since the latter part of that century (Fisheries Agency of Japan, 2003.) As is the case with many shark species, the identification and species-specific reporting of Spiny Dogfish catch is poor in many countries. Thus, the global landings data in **Table 2** are an underestimate of total Spiny Dogfish mortality incurred by fishing activity. It should also be noted that, while the FAO data do not include discards of Spiny Dogfish, it is generally recognized (IUCN, 2006) that Spiny Dogfish are thought to have a high survival rate when returned to the sea alive and therefore, in this instance, the exclusion of discards from FAO data may not be a significant factor.

Table 2
Landings of Spiny Dogfish, 1995 to 2004 (t)

FAO Area	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Atlantic, NE	19 281	16 508	14 101	13 634	12 098	12 093	12 616	10 065	10 109	8021
Atlantic, NW	1085	494	452	1081	2456	10 701	5995	5697	2422	3132
Atlantic, SW	-	-	-	-	-	-	-	-	-	-
Med. & Black Sea	182	143	95	97	143	204	287	231	245	166
Pacific, E Central	1	-	<0.5	5	24	8	3	17	11	28
Pacific, NE	2744	4000	2100	2501	6439	5363	5181	5691	6268	5974
Pacific, SW	2753	2477	7232	3064	4409	3362	4192	6186	3233	3241
Total	**26 046**	**23 622**	**23 980**	**20 383**	**25 569**	**31 731**	**28 274**	**27 887**	**22 288**	**20 562**

Source: FAO, 2006b.

Fisheries

In 2004, 94% of the reported global catch of Spiny Dogfish was taken in the fisheries of Canada (38%), the UK (24%), New Zealand (15%), the USA (6%), France (6%), and Norway (5%). The UK, France and Norway, along with other European and Scandinavian countries, fish the Northeast Atlantic Stock. Canada and the USA fish both the Northwest Atlantic and Northeast Pacific stocks and New Zealand fishes the Southwest Pacific stock of Spiny Dogfish. Details of the fisheries in the main catching countries are provided in **Box 1**.

Credit: Jürgen Freund

Spiny Dogfish, off Vancouver Island, site of much of Canada's directed fishery for the species

A number of South American countries, mainly Brazil and Argentina, exploit Spiny Dogfish. Neither of these countries report catches of Spiny Dogfish to the FAO. There is a lack of species identification and considerable uncertainty as to the level of and trends in Spiny Dogfish catch in the region as a whole. In Brazil, Spiny Dogfish is an important commercial, coastal species and is also taken as by-catch in a number of demersal fisheries. In other countries in the region, Spiny Dogfish is reported to be taken in unregulated and expanding target and by-catch fisheries (Massa *et al*., 2002).

Off southern Africa, the stock is exploited by South African demersal trawlers which take Spiny Dogfish as by-catch and discard around 99% (IUCN, 2006). There is no regulation of by-catch. EU import data include imports of around 10 t per year of Spiny Dogfish from Namibia since 2001. The nature and extent of the Namibian fishery is unknown.

Box 1: Characteristics of major Spiny Dogfish fisheries*

CANADA

Northwest Atlantic—2005 landings: 2270 t (DFO, 2006)

Historically, Spiny Dogfish was taken mainly as by-catch. However, a new directed fishery began in 2002 in the Bay of Fundy, Scotian Shelf and Gulf of St. Lawrence (IUCN, 2006). Spiny Dogfish are harvested mainly by the fixed gear sector (bottom longlines and handlines) (ASMFC, 2006). The Northwest Atlantic Fisheries Organization (NAFO) has reviewed all available information on Spiny Dogfish. It found that on average around 14 t of Spiny Dogfish was taken annually as by-catch in the Canadian St Pierre Bank (Div. 3Ps) (NAFO, 2006).

Northeast Pacific—2005 landings: 5433 t (DFO, 2006)

Around 80% of landings are from the directed bottom longline fishery for Spiny Dogfish (Roberts, 2005) in the Strait of Georgia and off the west coast of Vancouver Island. This fishery takes predominantly large adults. Other landings come from by-catch from the hook and line and trawl fisheries for Rockfish *Sebastes* spp., Hake *Merluccius* spp. and flatfishes. Most of the trawl by-catch is discarded (Bonfil, 1997).

UK (Northeast Atlantic)—2004 landings: 5030 t (FAO, 2006b)

In England and Wales more than 70% of the Spiny Dogfish landings are taken in line and net fisheries. Around 45% of the Scottish landings come from mixed demersal trawl fisheries and the remainder from long line and gillnet fisheries. More than 70% of Irish landings come from bottom otter trawlers and the remainder from line and gillnet fisheries (ICES, 2006).

NEW ZEALAND (Southwest Pacific)—2003/04 commercial landings: 4477 t (Ministry of Fisheries, 2005)

Taken by the deep-water fleet as by-catch in the Jack Mackerel *Trachurus novaezelandiae*, Barracouta *Thyrsites atun*, Hoki *Macruronus novaezelandiae*, Red Cod *Pseudophycis bachus*, and Arrow Squid *Notodarus sloanii* fisheries. Also taken as by-catch by inshore trawlers, set netters and longliners. Recreational landings are estimated at less than 10% of the total Spiny Dogfish catch (Ministry of Fisheries, 2005).

USA

Northwest Atlantic—2004 commercial landings: 980 t (ASMFC, 2006)

Commercial catches peaked at 27 000 t in 1996 (ASMFC, 2002). Most commercial catch is now taken in Massachusetts (74% in 2004) and Virginia (12%) (ASMFC, 2006) by otter trawl, gillnet and longline targeting of mature females. There is a trend towards more landings from gillnet and hook fishing (IUCN, 2006). Mature and immature males and immature females are taken as by-catch and discarded (Sosebee, 2000). Recreational landings in 2004 are estimated at between 819 t and 3325 t. In 2004/05 between one and two tonnes were taken under permits for biomedical purposes (ASMFC, 2006).

Northeast Pacific—2004 landings: 514 t (Washington State, Alaska, California, Oregon)

Most of Washington State's catch was taken in Puget Sound, but catches and population estimates in Puget Sound have declined dramatically and catch is primarily by recreational fishers and as by-catch (IUCN, 2006). Commercial catch in federal waters is taken by bottom longline and bottom trawl (Roberts, 2005). Directed shark fishing was banned off Alaska in 1998 but significant by-catch of Spiny Dogfish occurs in the Alaskan pelagic trawl and longline fisheries (Conservation Science Institute, 2006) and interest in developing fisheries is increasing.

FRANCE (Northeast Atlantic)—2004 landings: 1132 t (FAO, 2006b)

NORWAY (Northeast Atlantic)—2004 landings: 1054 t (FAO, 2006b)

Note: * Details of management arrangements in these fisheries are provided in **Table 4**.

The trade data provided in the section of this report on international trade indicate a growing fishery for Spiny Dogfish in Morocco. Little is known about the nature and extent of Morocco's fisheries for Spiny Dogfish. Morocco does not report catch of Spiny Dogfish specifically to FAO. However, data in relation to its catches of sharks and rays suggest that the catch of Spiny Dogfish is likely to be taken in the Eastern Central Atlantic.

Stock status

Many Spiny Dogfish populations are severely depleted and the species has been characterized by serial depletion around the globe. As fisheries off Europe became depleted in the late 1980s, fisheries in the USA and Argentina developed to fill the gap in supply on the European market. Subsequent declines in US catch saw development of fisheries off Canada and New Zealand. This trend appears to be continuing with the emergence of a fishery off Morocco.

A summary of the information available on stock status and data sources is provided in **Table 3**. Stock assessments have been conducted for only the Northeast and Northwest Atlantic, and Black Sea stocks. Those assessments show a depletion of around 95% in the Northeast Atlantic stock; a severe reduction in the abundance of females and very low estimates of recent recruitment in the Northwest Atlantic stock; and a 60% decline in the Black Sea stock. Landings in the Mediterranean Sea and Northwest Pacific suggest that these fisheries have been over-fished. Stocks in the Northeast Pacific appear to be stable. While no stock assessments have been conducted for the New Zealand fishery, management intervention at an early stage in the development of a directed fishery for Spiny Dogfish may prevent over-fishing. In contrast, lack of management action, expanding target and by-catch fisheries, and targeting of pregnant females in fisheries for Spiny Dogfish off South America, has seen significant declines in populations in some areas. There is no directed fishery for Spiny Dogfish off southern Africa. However, experience suggests that the deteriorating status of stocks elsewhere and the introduction of catch limits in some fisheries, together with continued strong international demand, may drive development of such a fishery.

CURRENT MANAGEMENT OF SPINY DOGFISH

Spiny Dogfish is not actively managed by any regional fisheries management organization (RFMO). Apart from the co-operative setting of a total allowable catch (TAC) between the EU and Norway for a small portion of the Northeast Atlantic stock, there are no known multilateral or bilateral management arrangements that cover stocks in their entirety. This is despite the fact that the species is migratory and that stocks are shared between EU Member States, between Canada and the USA, between countries off South America and between countries in southern Africa. A summary of the management arrangements in place for Spiny Dogfish is provided in **Table 4**.

Effective fisheries management accounts for all sources of mortalities of species fished, not just landed catch. In the main, this means accounting for commercial and recreational landings and discards. Generally, the commercial landings of target species are the best documented of these

Table 3

Summary of stock status information

Year	Location	Data used	Trend	Source	IUCN rating 2006
1905–2005	NE Atlantic	Stock assessment	93.4–94.8% depletion	ICES (2006)	Critically Endangered
1955–2005	NE Atlantic	Stock assessment	92.9–93.4% depletion	ICES (2006)	
1987–2000	Iberian coast	Landings	51% decrease	Directorate General for Fisheries and Aquaculture (DGPA), (1988–2001)	
From 2000	Iberian coast	Future projections	80.3% decline over next three generations	DGPA (1988–2001)	
1981–1992	Black Sea	Stock assessment	60% decline	Prodanov *et al*. (1997)	Vulnerable
	Mediterranean		Directed fisheries ceased owing to stock decline		Endangered
1988–2002	NW Atlantic	Stock assessment	75% decline in female spawning biomass	NEFSC (2003)	Endangered
1987–2002	NW Atlantic	Stock assessment	50% decline in av. weight of females	NEFSC (2003)	
1997–2003	NW Atlantic	Stock assessment	Recruitment failure	NEFSC (2003)	
1997–2006	NW Atlantic	Stock assessment	Not over-fished Reduction in abundance; imbalance in the sex ratio; low recent recruitment.	NEFSC (2006)	
1952–2000s	NW Pacific	Landings	>99% decline from ~60 000 t to ~460 t	Fisheries Agency of Japan (2003)and (2004)	Endangered
1970–1990s	NW Pacific	Catch-per-unit-effort	80–90% decline in trawl and seine fisheries		
	NE Pacific		Stable	McFarlane *et al*. (2005)	Vulnerable
	S. America		50% decline in abundance reported in Uruguay and Argentina	Massa *et al.* (2002)	Vulnerable
	Southern Africa		Relatively small quantities of by-catch are mostly discarded	IUCN (2006)	Least concern
	Australasia		New Zealand managing the fishery		Least concern

Sources: Anon., 2006; NEFSC, 2003; IUCN, 2006.

Table 4

Management arrangements for Spiny Dogfish fisheries

Fishery/Management	Comments
EU and Norway (NE Atlantic)	
The EU introduced a TAC for EU waters of subarea IV (North Sea) and Division IIa (Norwegian Sea) in 1999. The TAC has since been reduced from 8870 t in 1999 to 1051 t in 2006. Of this 90 t is allocated to Norway, which also has a 70 cm minimum landing size. There is no TAC for EU Member States or other European or Scandinavian countries for the remaining areas across which the stock is distributed.	Total catch in the International Council for the Exploration of the Sea (ICES) areas is estimated to have been 5356 t in 2005 (ICES, 2006). These estimates do not include discards. Of the 2005 TAC of 1136 t for Division IIa and subarea IV, only 976 t was taken (ICES, unpublished data). Catches in areas not subject to the TAC accounted for over 80% of the total catch. In 2005, ICES advised that the Northeast Atlantic stock was depleted and may be in danger of collapse. Further, ICES recommended that "target fisheries should not be permitted to continue and by-catch in mixed fisheries should be reduced to the lowest possible level. A TAC should cover all areas where spurdog [Spiny Dogfish] are caught in the Northeast Atlantic. This TAC should be set at zero for 2006." (ICES, 2005). This advice was not heeded in setting the 2006 TAC. ICES has reiterated this advice in 2006 (ICES, 2006).
USA (NW Atlantic and NE Pacific)	
Northwest Atlantic: Federal Spiny Dogfish fisheries are jointly managed by the New England Fishery Management Council and the Mid-Atlantic Fishery Management Council under the Spiny Dogfish Fishery Management Plan. The Plan took effect in the 2000/01 fishing year. Federal agencies have set trip limits and quotas ever since but these measures are not binding in State waters and directed fishing in those waters has continued. State fisheries for Spiny Dogfish are managed by the ASMFC which implemented an Interstate Fishery Management Plan (IFMP) for Spiny Dogfish from the 2003/04 fishing year. The Plan sets quotas and trip limits and provides for the issue of permits for take of Spiny Dogfish for biomedical purposes.	Scientific advice for 2006 recommended a 50% quota reduction, low trip limits and measures to reduce discarding. However, the Federal Agency retained the 2005 quota for 2006 and proposed the same value until 2008. The Federal arrangements have been undermined in the past by inconsistent State management by the ASMFC. Further, US stock assessments indicate that Canadian fishing on the same stock is unsustainable. The ASMFC has a history of rejecting scientific advice. Notably, in 2003 the ASMFC accepted a Massachusetts' proposal that more than doubled the quota and increased trip limits by an order of magnitude (Roberts, 2005). These limits have since been reduced and raised again. The ASMFC raised the 2007/08 quota by 50% (to approximately 2700 t) and will allow individual States to set the trip limits that are central to discouraging directed fishing on large females. Massachusetts, which took 70% of the 2006 quota, has proposed trip limits of approximately 900 t or four times the scientific advice despite a recommendation from the Spiny Dogfish Technical Committee to keep low limits in place.

Table 4
Management arrangements for Spiny Dogfish fisheries (continued)

Fishery/Management	Comments
Northeast Pacific: Spiny Dogfish are managed by the North Pacific Fishery Management Council under the Fishery Management Plan for the Gulf of Alaska. The Pacific Fishery Management Council manages Spiny Dogfish under the Pacific Coast Groundfish Fishery Management Plan. Further south, off continental USA, a population assessment is under way and management arrangements are being developed.	Directed fishing for Spiny Dogfish was banned off Alaska in 1998 and Spiny Dogfish is now, along with a number of other demersal sharks, skates and bony fish, managed as "other species". This is a category for which a percentage limit of the total allowable catch of target species is set. Spiny Dogfish are the only species in this category landed in significant quantities. Management has reduced the catch in Puget Sound (Washington State) and approximately 80% of the catch is now taken in federal waters (Roberts, 2005).
Canada (NW Atlantic and NE Pacific)	
Northwest Atlantic: Catch restrictions were imposed in 2002. The fixed gear (less than 45 ft (13.7 m)) sector is the only group permitted to fish actively for Spiny Dogfish in eastern Canada. It is allocated a 2500 t quota for the fishery off Nova Scotia and Bay of Fundy. The inshore and offshore dragger fleets are permitted to retain by-catch in the amount of 25 t annually for vessels <65 ft (19.8 m) and 10 t for larger vessels. By-catch for other fisheries is capped (ASMFC, 2006). An additional 700 t is provided for an industry sampling programme. Canada continues to hold its regulations constant while it completes a five-year Spiny Dogfish research programme which is now in its final year.	Canada continues to hold its regulations constant while it completes a five-year Spiny Dogfish research programme which is now in its final year.
Northeast Pacific: TACs have been set for Spiny Dogfish since the 1980s however these are far in excess of catch.	
New Zealand (SW Pacific)	
Spiny Dogfish have been subject to quota management since 2004. The total allowable commercial catch is set at 12 660 t.	It is unknown whether current catch limits are sustainable or whether they are at levels that will allow the stock to move towards a size that will support the maximum sustainable yield (Ministry of Fisheries, 2005). Landings are below the TAC (Anon., 2006).

Table 4
Management arrangements for Spiny Dogfish fisheries (continued)

Fishery/Management	Comments
Japan (NW Pacific), South America and South Africa	No management in place. Lack of species-specific data in many of these fisheries, particularly those in South America, means that the levels of and trends in catch are unclear.

components. Estimates of commercial discards are made in some fisheries and combined with estimates of post-release mortality to estimate mortality arising from such discards. Where the species discarded is not the subject of directed fishing there is generally less attention paid to collection of information on discards or mortality arising as a result. Globally, a considerable amount of Spiny Dogfish is known to be discarded. For example, in 2003 dead discards of Spiny Dogfish from US commercial fisheries were estimated to be around 6000 t (NEFSC, 2003). However, as noted above, the survival rate of Spiny Dogfish returned to the sea alive is considered to be relatively high (IUCN, 2006) although it will vary depending on the method of fishing and post-catch handling.

The nature of recreational fishing makes it even more difficult to collect information on landings and discards from this sector. Recreational catch of Spiny Dogfish is not well recorded globally. Estimates are made in relation to some stocks (for example, by New Zealand, and by the USA in relation to the Northwest Atlantic stock); however the credibility of these estimates is influenced by poor species identification and an inability to enforce mandatory reporting.

While there are differences in the nature and effectiveness of the management arrangements in place globally, management of Spiny Dogfish can be said to suffer from one or more of the following deficiencies:

- there is no management;
- management applies only to part of a stock or differential management arrangements apply to various parts of the same stock;
- catch and effort data are lacking or of poor quality;
- there is limited or no scientific information to inform management about sustainable catch levels;
- management arrangements do not reflect the scientific advice available;
- catch limits are set above current catch levels and are not therefore contributing to conservation outcomes;
- catch limits do not apply to total mortalities (i.e. they do not include mortalities incurred through discards or recreational fishing).

INTERNATIONAL TRADE

Processed and traded products

Spiny Dogfish product is known to be traded as fresh and frozen meat, including fillets; as tails; in smoked form; as fins; and as a number of by-products including cartilage and livers (or liver oil), hides, teeth and jaws.

The 'back' represents the main body of the fish accounting for 28-30% of the total live body weight. Backs are exported for ultimate sale as fillets and steaks and for use in the fish-and-chips trade. 'Belly flaps' are produced during the dressing of the fish and are individually skinned and washed prior to freezing. The belly flap accounts for an additional 7% of the live weight (Vannuccini, 1999).

In the USA, the belly flaps are cut out, the fins removed and the body is skinned leaving a white carcass or 'back' which is generally exported to Europe, particularly France and the UK. Belly flaps are exported to Germany where they are smoked and used to prepare *Schillerlocken*. Fins are frozen and exported to Asia. The backs are wrapped and frozen, either individually or in blocks, for export to the UK where they are sold for fish-and-chips. Spiny Dogfish are not filleted in the USA (Marine Institute of Memorial University of Newfoundland, 2006).

Canada exports Spiny Dogfish to Europe and fresh product to the USA for processing and re-export to Europe as backs and flaps for France, Germany and the UK. Fins and tails are processed for the Asian market (British Columbia Fisheries, 1999).

Smith and Benson (2001) note that most sharks in New Zealand are processed at sea with specimens 'trunked', that is the head, guts and fins are removed, and the product chilled or frozen. Further processing may take place on land and the product is exported as either trunks or fillets, predominantly to markets in Asia and Europe. Many in-shore fishers are not interested in processing and landing Spiny Dogfish because of processing problems owing to its spines, sandpaper-like skin, short shelf life and relatively low economic value, (Ministry of Fisheries, 2005).

Markets

The oil and meat of Spiny Dogfish have been widely traded for many years. In Europe, the commercial exploitation of Spiny Dogfish for meat started early in the 1920s. World demand for Spiny Dogfish oil as a source of vitamin A was strong in the 1940s, however this market has since been replaced by the development of synthetic vitamin A (Vannuccini, 1999). The major trade is now in meat products (fresh/chilled, frozen and smoked) and it is this trade that drives the fisheries for Spiny Dogfish. Other Spiny Dogfish products, including fins, cartilage, skins, teeth and jaws also enter international trade but these are largely by-products of the processing of Spiny Dogfish for meat. While the fins of Spiny Dogfish are routinely removed and

marketed, predominantly to Asia, they are not regarded as high quality and are sold at a relatively low market price.

While a limited number of countries have Customs codes specific to Spiny Dogfish, the global trade in Spiny Dogfish meat is not well documented and there is no global collection of data on trade in the species. FAO collects trade data on 'Dogfish (Squalidae) fresh or chilled' and 'Dogfish (Squalidae) frozen'. However these data relate to a number of Squalidae species.

Trade data specific to Spiny Dogfish are available from one of the major markets, the EU, and a major exporter, the USA. Other countries record trade in Spiny Dogfish under general fish trade codes and in some instances in codes such as 'dogfish and other sharks'. Such codes are generally not helpful for the purposes of trade analysis. However, the export data available for 'dogfish and other sharks' for Canada has been used, in conjunction with additional advice on the likely composition of the exports, as an indicator of the pattern, rather than the quantity, of Canadian exports of Spiny Dogfish. Trade in other Spiny Dogfish products, including fins, is recorded under various non-species-specific trade codes.

The EU and the USA provide data for Spiny Dogfish for the two categories of 'fresh or chilled', and 'frozen'. The EU also records data for 'frozen fillets of Dogfish' (*Squalus acanthias* and *Scyliorhinus* spp.), but since this category is not specific to Spiny Dogfish it is not very instructive. It does indicate, however, that some Spiny Dogfish product is traded in fillet form.

The EU is the major market for Spiny Dogfish meat. The demand in the EU, predominantly in France, Germany and the UK, is met from catches by EU Member States together with imports. A summary of the sources of imports of Spiny Dogfish to the EU is contained in **Table 5**. Not surprisingly, the major sources of imports are also the major catching countries identified above. In addition, Argentina has been a consistently significant supplier to the EU and, since 2000, Morocco has become an increasingly important source. Of the countries identified in **Table 5**, four (Morocco, Argentina, Iceland and Mauritania) are not recorded by FAO as catching Spiny Dogfish.

The main European markets for Spiny Dogfish prefer larger specimens, driving fisheries to focus on catching the larger females which form separate schools. The German market for belly flaps prefers sizes of at least 30 cm long. The German market imports both belly flaps and backs (whole, skinless, headed and gutted, bellies removed). Flaps are smoked to produce *Schillerlocken* or sold fresh or frozen and skinned. Backs are marketed fresh or smoked as *Seeal*. France imports backs and whole (head-off, tail-off, skin-off, gutted) Spiny Dogfish. The UK imports fresh Spiny Dogfish product predominantly from Canada, the Faeroe Islands and Iceland. Frozen Spiny Dogfish imports into the UK are sourced from Canada and the USA (European Commission, 2006). The UK requires dressed carcasses (head-off, tail-off, skin-off, gutted) (Vannuccini, 1999). The EU also exports small quantities of Spiny Dogfish product (see **Table 6**).

Table 5

Countries supplying Spiny Dogfish (fresh and chilled and frozen combined) to the EU (t)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Iceland	31	73	67	48	32	70	107	221	150	95	45
Norway	3132	2416	1394	1065	1239	1447	1396	1108	1080	991	937
USA	7581	8938	8181	6817	6317	3761	1671	1664	909	753	720
Canada	469	145	228	370	599	1003	1569	1610	1540	1752	1484
Morocco	0	0	0	0	0	71	206	212	190	388	460
Mauritania	168	206	52	90	66	292	305	91	61	0	43
Argentina	204	313	68	256	253	232	310	263	341	119	315
N. Zealand	29	5	18	15	71	152	195	448	319	244	250
Others	312	209	164	116	120	210	106	195	184	192	351
Total	**11 926**	**12 305**	**10 171**	**8778**	**8696**	**7238**	**5863**	**5811**	**4774**	**4534**	**4605**

Source: European Commission, 2006.

Table 6

EU exports of Spiny Dogfish, 1996 to 2005 (t)

Destination	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Fresh or chilled										
Switzerland	0	0	0	0	0	0.5	0.3	0	0	0.2
Norway	4.5	5.3	1.5	0.4	0	0	3.7	0	1.5	0
Total	**4.5**	**5.3**	**1.5**	**0.4**	**0**	**0.5**	**4**	**0**	**1.5**	**0.2**
Frozen										
Belarus	0	0	0	0	0	0	0	0.1	0	0
Switzerland	2.2	1.1	0	0	0	0.5	0.6	0	0	0
Algeria	0	0	0	0	0	0	0	0	16.2	0
Egypt	0	0	0	0	120	0	0	0	0	0
Croatia	0	0	0	0	0	0	0.4	0	0	0
Morocco	0	0	0	0	0	0	0	0	8.8	8.7
Macedonia	0	0	0	0	0.1	0	0	0	0	0
Norway	12.9	13.2	12.7	12.2	10	5.2	4.1	1.9	20.3	0
Russia	2	0	0	0	6.4	7.2	14.8	30.1	14.8	44.2
Singapore	5.2	0	0	0	5.6	1	0	0	0	0
Thailand	0	0	0	0	0	0	1.6	0	0	0
Tunisia	0	0	0	0	1.6	0	0	0	0	0
Ukraine	0	0	0	0	0	0	0	0	0	1.5
USA	0	0	0	0	20	0	0	0	0	0
Total	**22.3**	**14.3**	**12.7**	**12.2**	**163.7**	**13.9**	**21.5**	**32.1**	**60.1**	**54.4**

Source: European Commission, 2006.

In 2005, 95% of US exports of Spiny Dogfish were destined for markets in the EU. These exports included substantial quantities of Spiny Dogfish product landed in Canada that was then imported by the USA, processed and subsequently exported. Other significant markets for US Spiny Dogfish products (see **Table 7**), include Mexico, Thailand, Hong Kong and Australia.

Canadian export data for 'Dogfish and other sharks' suggest that around 60% of this category was exported to the USA and a further 37% to the UK in 2005.

Table 7
US exports of Spiny Dogfish, fresh/chilled and frozen, 1996–2005 (t)

Destination	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Germany	2930	1774	1687	1010	1690	1032	250	350	339	527
Netherlands	4	359	458	520	350	152	159	154	157	167
France	4930	3760	2002	1951	1518	454	217	196	149	126
China, Hong Kong	4	28	97	303	106	8	326	248	135	0
Mexico	44	37	10	45	21	57	92	30	113	173
Thailand	76	207	13	162	270	421	267	219	104	147
Belgium	632	389	292	461	488	234	299	169	99	35
Australia	0	10	0	12	35	79	94	110	69	31
UK	1095	960	974	871	430	120	100	45	57	86
Georgia	0	0	0	0	0	0	0	0	45	0
Italy	202	117	86	193	149	60	105	3	31	34
Japan	298	161	553	254	88	20	95	31	19	0
Others	769	476	38	418	295	65	23	0	15	66
Total	**10 984**	**8279**	**6210**	**6200**	**5439**	**2702**	**2029**	**1554**	**1331**	**1392**

Source: Personal communication from the NMFS, Fisheries Statistics Division, Silver Spring, MD, October 2006.

CITES

CITES is an international agreement between governments. The aim of the Convention is to ensure that international trade in specimens of wild animals and plants does not threaten their survival in the wild. The Convention recognizes that international co-operation between countries is essential to prevent some species from becoming over-exploited and it provides a framework in which this co-operation can occur.

CITES entered into force on 1 July 1975. Since that time the Convention has provided varying degrees of protection to over 30 000 species (more than 25 000 plant and 5000 animal species) and has expanded to include 169 Parties. Parties are required to implement their own domestic legislation to support CITES decisions at the national level. The requirements of Parties depend on the CITES Appendix (Appendix I, II or III) in which a species is listed and the nature of the Party's participation in international trade in that species. Appendix I includes species that are threatened with extinction, Appendix II lists species that may become threatened if trade is not

effectively regulated and Appendix III includes species for which individual Parties seek international co-operation in regulation and monitoring of trade in order to protect a species. An overview of the conditions under which species listed in the various Appendices can be traded is provided in **Table 8**.

Table 8
Summary of conditions for trade under each CITES Appendix

Appendix	Permit conditions	Export permit required?	Re-export certificate required?	Import permit required?
I	Not for commercial trade; Non-detriment and legal findings required; avoids cruel or injurious shipping of live specimens	Yes—granted only if import permit already in hand	Yes—granted only if in accordance with CITES and there is a valid import permit	Yes
II	Non-detriment and legal findings required; avoids cruel or injurious shipping of live specimens	Yes	Yes—granted only if import was in accordance with CITES	No* —requires prior presentation of the export permit, certificate of origin, re-export permit or re-export certificate (whichever applicable)
III The exporting Party has listed the species	Trade is legal; trade avoids cruel or injurious shipping of live specimens	Yes	Yes—granted on the basis that the specimens were processed in/ re-exported from that State	No
III The exporting Party has not listed the species	Specimen originated from that Party	No—certificate of origin required	Yes—granted on the basis that the specimens were processed in/re-exported from that State	No

***** An import permit is not required for Appendix II-listed species, however CITES provides for Parties to implement stricter domestic measures, and some Parties, for example, EU Member States, require import permits for Appendix II-listed species.

Source: Adapted from Clarke, 2004, and Willock, 2004.

This report is concerned with the implications of a potential listing of Spiny Dogfish in Appendix II of CITES. The key elements of an Appendix-II listing for a marine species such as Spiny Dogfish are described below.

Application of an Appendix-II listing

CITES requires certain actions to be undertaken by exporting, re-exporting and importing countries in relation to the authorization of trade in CITES-listed species. CITES defines 'trade' to include imports, exports, re-exports and, importantly for marine listed species, 'introduction from the sea'. Introduction from the sea is defined in the Convention as '… transportation into a State of specimens of any species which were taken in the marine environment not under the jurisdiction of any State.' [7]

Central to the implementation of CITES is the designation by each of its Parties of a CITES Scientific Authority and a CITES Management Authority. The role of these authorities varies according to the Appendix in which a species is listed and the transaction (import/export) taking place. The following points describe the role of these Authorities and other elements of CITES in relation to an Appendix II-listed species.

- Appendix II includes species that may become threatened if trade is not effectively regulated. A listing does not necessarily mean that the species is currently threatened with extinction or that trade will be limited. The CITES Parties have agreed on listing criteria[8] that require that Appendix II should include those species for which the harvesting of specimens from the wild for international trade has, or may have, a detrimental impact on the species by either exceeding, over an extended period, the level of harvesting that can be continued in perpetuity, or reducing the species to a population level at which its survival would be threatened by other influences.

- Trade in an Appendix-II species requires the issue of an export permit by the exporting or re-exporting Party and the prior presentation of that permit to the importing State. Once a species is listed, the only trade that could occur without such documentation would be between two non-Parties to CITES or between Parties that had each taken out a reservation to the listing of the species concerned. Any Party may enter a reservation within 90 days of a listing. A reservation results in that Party being treated as a non-Party to the Convention for the purposes of that listing. A reservation can be withdrawn at any time.

- The issue of an export permit for trade in an Appendix-II species relies on the making of a biological 'non-detriment' finding by the Scientific Authority established by the exporting Party and a legal finding by the Management Authority of that Party.

  ~ A non-detriment finding implies that trade in the species will not be detrimental to the survival of the species in the wild.

Credit: Glenn Sant/TRAFFIC

Meeting on non-detriment findings between representatives of Papua New Guinea and Australia, 2006

- ~ A non-detriment finding can include the determination by the Scientific Authority of the need to limit exports by, for example, an annual quota.
- ~ A legal finding means that the species was not obtained in contravention of the laws of the Party.

- Where an Appendix-II species is re-exported, the Management Authority of the re-exporting Party must be satisfied that the product was imported in accordance with CITES provisions.

- Other 'look-alike' species can also be listed in Appendix II, if this is necessary to ensure that trade in species listed in Appendix II for conservation reasons can be brought under effective control.

- A listing, or a removal of a listing, in Appendix II is authorized by a meeting of the Conference to the Parties to CITES, where it requires the support of a two-thirds' majority of Parties present and voting (or sometimes by postal voting).

ISSUES ASSOCIATED WITH AN APPENDIX-II LISTING OF SPINY DOGFISH

The effectiveness of a CITES listing will depend on a range of factors including:

- the comprehensiveness of the application of CITES regulations to catch of Spiny Dogfish. This will depend on:
  - ~ the proportion of range States that are Parties to CITES and the extent of trade between non-Parties
  - ~ the proportion of catch that is traded and that will be subject to CITES regulations
- the feasibility of readily identifying Spiny Dogfish products in trade
- the need for listing of look-alike species
- the feasibility of developing agreed criteria for non-detriment findings, especially those for shared stocks
- the potential impact of any reservations taken out by Parties in respect of a listing

Comprehensiveness

A list of States involved in the catch and trade of Spiny Dogfish is provided in **Table 9**, which is compiled from information in the CITES listing proposal (identifies range States) (Anon., 2006); the FAO Fishstat Plus Database (identifies catching countries having recorded catch of Spiny Dogfish between 1995 and 2004); trade records of the EU and the USA (identify countries occurring in trade data specific to Spiny Dogfish); and the trade data for 'Dogfish and other sharks' for Canada between 1995 and 2005. Some of the countries identified have had minimal involvement in catch and/or trade over the last decade but have been included for completeness.

Table 9

Range States and participants in catch and trade of Spiny Dogfish since 1995

State	Management in place	Catch reported	Exports re-exports recorded	Imports recorded	EU member	CITES Party
Range States						
Albania			Yes			Yes
Algeria				Yes		Yes
Angola						No
Argentina			Yes			Yes
Australia				Yes		Yes
Belgium	Yes	Yes		Yes	Yes	Yes
Canada	Yes	Yes	Yes	Yes		Yes
Canary Islands (Spain)					Yes	Yes
Chile			Yes			Yes
China			Yes	Yes		Yes
Cuba		Yes				Yes
Cyprus				Yes	Yes	Yes
Denmark	Yes	Yes		Yes	Yes	Yes
Egypt				Yes		Yes
Estonia					Yes	Yes
Faeroe Islands (Denmark)		Yes	Yes			No
Falkland Islands (Malvinas)						Yes
Finland					Yes	Yes
France	Yes	Yes		Yes	Yes	Yes
French Polynesia (France)					Yes	Yes
Gabon						Yes
Georgia				Yes		Yes
Germany	Yes	Yes		Yes	Yes	Yes
Greece				yes	Yes	Yes
Greenland (Denmark)						Yes
Iceland		Yes	Yes			Yes
Ireland		Yes	Yes	Yes	Yes	Yes
Israel						Yes
Italy				Yes	Yes	Yes
Japan				Yes		Yes
Kerguelen Islands (France)					Yes	Yes
Korea (North)				Yes*		No
Korea, Republic of (South)			Yes	Yes		Yes
Latvia					Yes	Yes
Lebanon						No
Libyan Arab Jamahiriya						Yes
Lithuania				Yes*	Yes	Yes
Malta		Yes			Yes	Yes
Mauritius						Yes
Mexico			Yes	Yes		Yes
Monaco						Yes
Montenegro						No
Morocco			Yes	Yes		Yes
Namibia			Yes			Yes
Netherlands	Yes	Yes		Yes	Yes	Yes
New Zealand	Yes	Yes	Yes			Yes

Table 9 (continued)

Range States and participants in catch and trade of Spiny Dogfish since 1995

State	Management in place	Catch reported	Exports re-exports recorded	Imports recorded	EU member	CITES Party
Norway	Yes	Yes	Yes	Yes		Yes
Philippines						Yes
Poland				Yes	Yes	Yes
Portugal		Yes		Yes*	Yes	Yes
Romania		Yes				Yes
Russian Federation				Yes		Yes
Serbia						Yes
Slovenia		Yes			Yes	Yes
South Africa			Yes			Yes
Spain		Yes	Yes	Yes	Yes	Yes
Sweden	Yes	Yes		Yes	Yes	Yes
Syrian Arab Republic						Yes
Tunisia				Yes		Yes
Turkey			Yes			Yes
Ukraine		Yes		Yes		Yes
UK	Yes	Yes	Yes	Yes	Yes	Yes
Uruguay			Yes	Yes		Yes
USA	Yes	Yes	Yes	Yes		Yes
Western Sahara						
Non-range States/territories						
Barbados			Yes			Yes
Belarus				Yes		Yes
Bosnia & Herzegovina				Yes		No
Brazil			Yes			Yes
Bulgaria		Yes		Yes		Yes
Colombia				Yes		Yes
Congo			Yes			Yes
Costa Rica			Yes			Yes
Croatia			Yes	Yes		Yes
Czech. Republic				Yes		Yes
Ecuador			Yes			Yes
Fiji				Yes		Yes
Georgia				Yes		Yes
Ghana			Yes			Yes
Guinea			Yes			Yes
Guinea-Bissau			Yes			Yes
Honduras			Yes			Yes
Hong Kong (China)			Yes	Yes		Yes
Hungary				Yes		Yes
Indonesia			Yes	Yes*		Yes
Jamaica				Yes		Yes
Iran, Islamic Rep.			Yes			Yes
Kazakstan				Yes*		Yes
Kenya			Yes			Yes
Luxembourg			Yes			Yes
Macedonia				Yes		Yes
Malaysia				Yes		Yes
Martinique (France)				Yes		Yes

Table 9 (continued)
Range States and participants in catch and trade of Spiny Dogfish since 1995

State	Management in place	Catch reported	Exports re-exports recorded	Imports recorded	EU member	CITES Party
Mauritania			Yes			Yes
Oman			Yes			No
Panama			Yes			Yes
Peru			Yes			Yes
San Marino				Yes		Yes
Senegal			Yes			Yes
Singapore			Yes	Yes		Yes
Svalbard (Norway)				Yes		No
Swaziland				Yes		Yes
Switzerland				Yes		Yes
Taiwan			Yes	Yes		No
Thailand			Yes	Yes		Yes
Togo			Yes			Yes
Trinidad and Tobago				Yes		Yes
Turks and Caicos Island (UK)				Yes		No
United Arab Emirates				Yes*		Yes
Venezuela			Yes	Yes		Yes
Viet Nam			Yes	Yes		Yes
Yemen			Yes			Yes

Notes:

Exports/re-exports recorded: exports designated as Spiny Dogfish recorded in that State's international trade statistics; or imports from that State of Spiny Dogfish recorded in the international trade statistics of an importing country. For EU Member States, intra-EU trade is excluded. Where a country has become a member of the EU during the 1995 to 2005 period it is treated as though it had been a member throughout the period.

Imports recorded: imports designated as Spiny Dogfish recorded in that State's international trade statistics; or exports to that State of Spiny Dogfish recorded in the international trade statistics of an exporting country. For EU Member States, intra-EU trade is excluded. Where a country has become a member of the EU during the 1995 to 2005 period it is treated as though it had been a member throughout the period.

Imports and exports/re-exports refer to trade in fresh and frozen Spiny Dogfish and do not include fins, fillets or other Spiny Dogfish products for which species-specific product codes are not available.

***** identified as a destination for Canadian exports of "Dogfish and other sharks": trade could be composed of shark products other than Spiny Dogfish.

Sources: Anon., 2006; personal communication from the NMFS, Fisheries Statistics Division, Silver Spring, MD, October 2006; European Commission, 2006; FAO, 2006b; Industry Canada, 2006.

It is apparent that, of the 112 range States or countries/territories/entities involved in trade in Spiny Dogfish, only 10 countries are not Parties to CITES. None of those 10 has significant catch and/or trade in Spiny Dogfish. All of the 22 countries/territories recorded as taking Spiny Dogfish are Parties to CITES—but one, the Faeroe Islands, does not implement CITES provisions. Of the known exporting countries/territories/entities, three (the Faeroe Islands, Oman and Taiwan[9]) are not Parties to CITES. Three known importing countries/entities are not

CITES Parties (Bosnia and Herzegovina, the Democratic People's Republic of Korea (North Korea) and Taiwan). Overall, the involvement of non-Parties to CITES in the trade of Spiny Dogfish is considered unlikely to constrain the effectiveness of a CITES listing significantly.

Credit: Caroline Raymakers/TRAFFIC

Spiny Dogfish on display at a seafood exhibition in Belgium, in 1998

A large proportion of the global Spiny Dogfish catch is traded internationally. This means that, if Spiny Dogfish were listed in Appendix II of CITES, CITES provisions would apply to a similarly large proportion of the global catch and, as a result, an Appendix-II listing is likely to make a significant contribution to the overall conservation and management of this species. However, as noted earlier, most of the catch of one stock of Spiny Dogfish, the Northeast Atlantic stock, is taken by EU countries. While EU countries export small quantities of Spiny Dogfish product, the bulk of this catch is consumed in the catching country or traded internally with other EU Member States. Potentially, this may reduce the impact of a CITES listing on the Northeast Atlantic stock.

As mentioned, the Faeroe Islands, one of the range States exploiting the Northeast Atlantic stock, does not implement CITES provisions. The Faeroe Islands catches significant quantities of Spiny Dogfish and the EU has recorded imports of Spiny Dogfish from the Faeroe Islands in all but one of the last 10 years, although imports had declined to 13 t by 2005. Owing to stricter measures adopted under EU regulations, an Appendix-II listing of Spiny Dogfish would mean that the EU would require the issue of an import permit and, in order to export to the EU or any other CITES member, the Faeroe Islands would be required to provide comparable documentation issued by the competent authorities that substantially comply with CITES requirements. Imports would not take place if the EU were not satisfied that the catch of the Faeroe Islands was non-detrimental to the survival of the species. Since most known importing countries are CITES Parties, those countries would require the issue of an equivalent to an export permit, and hence a non-detriment finding, if product were to be imported from the Faeroe Islands.

Overall, the impact of these factors on the application of CITES to the Northeast Atlantic stock is not regarded as a significant limiting factor on the global effectiveness of a listing of Spiny Dogfish.

Identification of Spiny Dogfish products

The form in which Spiny Dogfish is traded internationally has important implications for the effective implementation of a CITES Appendix-II listing. The key issue is whether the product is readily identifiable as Spiny Dogfish product.

CITES regulates the trade in 'specimens' of listed species. Article I of CITES defines a 'specimen' of an animal species listed in Appendix II as 'any readily recognizable part or derivative thereof'. This definition has been interpreted by CITES (CITES *Resolution Conf. 9.6 (Rev.*)) to include 'any specimen which appears from an accompanying document, the packaging or a mark or label, or from any other circumstances, to be a part or derivative of an animal or plant of a species included in the Appendices, unless such part or derivative is specifically exempted from the provisions of the Convention.'.

The effective implementation of a CITES listing for Spiny Dogfish will rely in part on the extent to which 'laundering' of Spiny Dogfish products under other names might occur. This will depend on the level of incentives to do so and on the effectiveness of compliance agencies in detecting such activity.

Mis-identification of Spiny Dogfish product could arise from:

- the refusal of a Scientific Authority or a Management Authority to issue an export/re-export permit and the subsequent laundering of Spiny Dogfish product as another species;
- knowledge by the exporter that the specimen was taken illegally (i.e. in contravention of domestic management arrangements);
- a higher price for product marketed under another name;
- unintentional mis-identification of product.

It is not possible to assess the likelihood of decisions to refuse the grant of export/re-export permits or to predict the level of compliance with management measures. However, the meat of Spiny Dogfish, the main commodity traded, commands higher prices than that of most other shark species so it is unlikely that the third factor above will come into play. In fact, there is probably a greater incentive to mislabel other, lower value, shark products as Spiny Dogfish. Given the current concerns about the poor identification and reporting of Spiny Dogfish at species level, it is possible that unintentional mis-identification could occur at the catch level. However, in view of the processing requirements for Spiny Dogfish, it is less likely that this would occur at the processing and export packaging stage. Where product is processed at sea and landed together with other shark products it is possible that mis-labelling could occur. Smith and Benson (2001) note, for example, that in New Zealand landed catches may include several species. However, Spiny Dogfish are subject to catch limits in many of the major fisheries. Under these circumstances, responsible management agencies presumably already have mechanisms in place to identify Spiny Dogfish landings accurately. In these fisheries, Spiny Dogfish should be correctly identified when it reaches processing plants.

The capacity of Customs officials to detect Spiny Dogfish product not otherwise identified, will depend in large part on how readily recognizable these products are. As whole specimens, Spiny Dogfish are readily identifiable. However the removal of fins, skin, head and tail, often at sea, and subsequent processing of the carcass to produce backs, belly flaps and fillets, makes the ready identification of Spiny Dogfish product more difficult.

The development of identification guides for Customs officials may go some way to addressing this problem. Where doubts arise, or where laundering is known to have been occurring, DNA testing may be an appropriate tool. That is, DNA testing should be seen as a tool for enforcement rather than for routine screening. While there is no specific test for Spiny Dogfish currently available, the proposed delay in implementation of a listing, if supported by the Parties, would provide sufficient lead time to develop a species-specific test. It is recognized that such tests have both cost and time constraints. The latter may be particularly relevant in relation to the trade in fresh product where a two-to-seven day timeframe for DNA results (Anon., 2006) may not be feasible. In addition, the availability of DNA testing may be restricted in developing countries.

Significant quantities of Spiny Dogfish fins are also known to be traded, as are smaller quantities of livers, oils, skins and teeth. It is likely to be very difficult to detect fins and these other derivates of Spiny Dogfish. As noted by the CITES Animals Committee (2006), 'small fins of listed species as well as processed fins (especially if separated into fin rays), and most shark meat products are more difficult to identify, particularly if traded amongst products from other, unlisted species. Without additional measures, and if not labelled, a large percentage of such products could pass inspection undetected.'. The distinctive spine in front of the dorsal fins of Spiny Dogfish may help to differentiate the fins of Spiny Dogfish from those of other sharks, if it remains attached to the fins when removed from the shark.

Unlike the case with many other shark species, it is the meat of Spiny Dogfish rather than fins or other by-products, which drives exploitation of Spiny Dogfish stocks. Failure to identify these by-products is unlikely to compromise the management or sustainability of the species; that is, the level of mortality on the stock is likely to remain the same.

The introduction of species-specific commodity codes for this species by all trading countries would be a major step forward in contributing to the monitoring and identification of trade in Spiny Dogfish. The lack of species-specific Customs codes for other CITES-listed species of shark has been identified as a widespread obstacle to effective implementation of shark listings (CITES Animals Committee, 2006). The Animals Committee is developing suggested Customs codes for both listed and non-listed shark species. The effective implementation of a CITES listing for shark species will require the implementation of product-specific trade codes for shark products as well as species-specific codes for listed species.

Look-alike species

Annex 2b to CITES *Resolution Conf. 9.24* requires that other species be listed in Appendix II when '… the specimens resemble specimens of a species included in Appendix II under the provisions of Article II, paragraph 2(a), or in Appendix I, such that a non-expert, with reasonable effort, is unlikely to be able to distinguish between them'.

As noted above, the potential exists for processed Spiny Dogfish product, especially by-products, to be confused or mis-labelled as a range of other shark species. It is likely that a

relatively large number of other species would need to be listed in order to address what is a minor issue, since it is not the by-products that are driving the fisheries for Spiny Dogfish.

Credits: © Chris Huss/SeaPics.com

Spiny Dogfish, East Pacific Ocean

One alternative to listing 'look-alikes' is to restrict the trade in Spiny Dogfish to forms such as carcasses, which are more readily identifiable. However, this would have significant impacts on the location and viability of many processing establishments and implications for economic returns as a result of loss of opportunities for value adding and potentially higher transport costs. This would seem to be unpalatable to most exporting countries and would not appear to be a feasible option.

CITES provisions do not apply if the part or derivative is not readily recognizable. This is likely to be the case in relation to unlabelled fins and other by-products. As already discussed, this is not regarded as a serious constraint to the effectiveness of a listing.

If a listing were to proceed, a practical approach would be to acknowledge the potential for some laundering to occur and establish a monitoring programme to assess the known areas of high risk for laundering, for example, through spot DNA checks of product of look-alike species to ascertain whether they are in fact Spiny Dogfish. Over time, this would identify particular species that could be considered for listing as look-alike species if the extent of the problem warranted it. As noted above, since a number of Spiny Dogfish fisheries are subject to catch limits it is likely that there will be an existing level of monitoring, compliance and enforcement in place to prevent mis-identification. This level might be expected to increase as a CITES listing began to have an impact on conservation and management.

Shared stocks

A CITES listing could be expected to result in increased co-operation between jurisdictions fishing for Spiny Dogfish because of the need to make non-detriment findings on shared stocks. This would enhance conservation and management by encouraging complementary measures for such stocks; however the development of agreed criteria for the making of non-detriment findings and the development of complementary management measures in support of such findings will necessarily involve negotiations over an extended period of time.

The draft proposal to list Spiny Dogfish in Appendix II of CITES acknowledges that a considerable lead time, of up to 18 months, may be required to allow technical and administrative issues surrounding implementation of the CITES provisions to be resolved.

The provision of a delay between a decision to list and the listing taking effect would allow those jurisdictions that share responsibility for stocks to agree on criteria for non-detriment findings and possibly to conduct joint stock assessments and ensure that management measures were complementary. This will be an issue predominantly for: Canada and the USA; for the EU, Norway and the Faeroe Islands; for South Africa and Namibia; and for Argentina and Brazil. In particular, the results of the Canadian assessment of Northwest Atlantic Spiny Dogfish are due in 2007 and this may provide valuable information for the management of that stock off Canada and the USA. A new assessment of Spiny Dogfish stocks in the Northeast Pacific should also be available by around 2007 (Roberts, 2005).

The delay would also provide opportunities to resolve inconsistencies in domestic management measures that arise from jurisdictional issues, for example, between State and federal authorities in the USA. Delays between listing and the listing taking effect have been used with respect to other Appendix II-listed marine species; for example there was an 18-month delay prior to the *Hippocampus* listing coming into effect, in part to enable the basis for non-detriment findings to be developed further.

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Introduction from the sea

As noted in the previous section of this report, one component of 'trade' as defined by CITES is 'introduction from the sea' which is defined as '..transportation into a State of specimens of any species which were taken in the marine environment not under the jurisdiction of any State'.

The significance of a specimen listed in Appendix II invoking the 'introduction from the sea' provision lies in the CITES requirement for the prior granting of a certificate from the Management Authority of the State of introduction. The certificate can only be granted where the Scientific Authority of that State makes a non-detriment finding. Since an 'introduction from the sea' is regarded as trade such a finding would be required regardless of whether the product was for domestic consumption in the State of introduction or for export.

With regard to 'marine environment not under the jurisdiction of any State', CITES has yet to adopt explicitly the jurisdictional regime for marine waters established by the United Nations Convention on the Law of the Sea (UNCLOS) despite that Convention having entered into force in 1994 (Willock, 2002). UNCLOS provides for States to declare jurisdiction in respect of a 200-nm zone, replacing the earlier 12 nm. The failure on the part of CITES to clarify this leaves open the question as to whether the 'marine environment not under the jurisdiction of any State' refers to a 12-nm or a 200-nm zone. This has implications for Spiny Dogfish since, while it is generally accepted that Spiny Dogfish is a shelf species and not likely to be found outside 200 nm, it is possible that Spiny Dogfish taken outside a 12-nm zone could invoke the 'introduction from the sea' provisions, given lack of interpretation by CITES of 'the marine environment not under the jurisdiction of any State'.

CoP13 directed the CITES Standing Committee to convene a workshop to consider implementation and technical issues surrounding the 'introduction from the sea' provisions. This workshop was held in December 2005 and agreed on a definition for 'marine environment not under the jurisdiction of any State' and narrowed the focus for work related to clarification of 'transportation into a State' although made no recommendation on the latter. The workshop has recommended that 'marine environment not under the jurisdiction of any State' means 'those areas beyond the waters and the continental shelf, comprising the seabed and subsoil, subject to the sovereign rights or sovereignty of any State consistent with international law, as reflected in the United Nations Convention on the Law of the Sea' (CITES Secretariat, 2006). The workshop's recommendation has been distributed to the Parties for comment and CoP14, in 2007, will consider the recommendation. In the absence of an agreed CITES position, the recommendation has been used here to represent the most recent and commonly accepted position on the issue.

Credit: Mary Hansford/TRAFFIC

CITES in action: the thirteenth meeting of the Conference of the Parties to CITES (CoP13; above) designated a working group to consider definition of the term 'introduction from the sea'.

Spiny Dogfish do migrate and can occur in deep water, however it is very unlikely that catch would be taken outside the 200-nm jurisdictional limits established by most States under UNCLOS. In such an event, it would be difficult to make a robust non-detriment finding for any such catch since there are no RFMOs currently managing the species and there is likely to be a lack of clarity regarding both the population from which the catch was derived and the status of that population. In the case of Spiny Dogfish, it is considered that this would be, at worst, a rare event and in all likelihood would not arise as an issue.

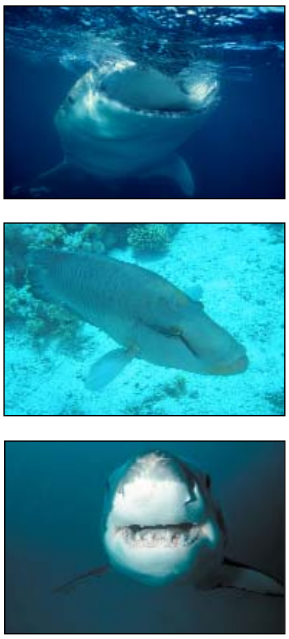
Reservations

The provision for CITES Parties to take out a reservation in relation to an Appendix-II listing of Spiny Dogfish could potentially constrain the effectiveness of a listing. However, there would only be a significant impact on the effectiveness of a listing if reservations were taken out both by the major importer, the EU, and an individual exporting country or countries.

It is worth noting, however, that both Iceland and Norway, which are significant players in the catch and trade of Spiny Dogfish, have taken out reservations in relation to each of the three shark species currently listed in Appendix II of CITES.

Other implementation issues

Practical experience in the use of CITES as a mechanism for conservation of marine fish species remains relatively limited and many countries are still coming to terms with dealing with the application of CITES provisions to these species. However, the listing of Basking, Great White and Whale Sharks and Humphead Wrasse, together with a range of other traded marine species, has provided many CITES Parties with the opportunity to develop their understanding of the issues involved and their capacity to deal with them.



Credits: (top to bottom) WWF-Canon/Erkki Siirilä; WWF-Canon/Frédéric Monnot; WWF-Canon/Wildlife Pictures/Jérome Mallefet

Top to bottom: Whale Shark, Humphead Wrasse and Great White Shark, species whose CITES-listing has helped create a wider understanding of CITES as a tool for conservation of marine fish

Despite this, the capacity for the making of reliable non-detriment findings is limited in a number of developing countries and the costs associated with implementation of the provisions may be beyond the reach of some countries.

Such issues are best addressed at a strategic level rather than regarded as barriers to the introduction of effective trade measures for a particular species. Those Parties with the capacity to do so should assist those who lack expertise or funding to develop practical and cost-effective mechanisms to support CITES provisions. The benefits arising from such actions will have broad application to the effective implementation of CITES rather than being restricted to the conservation of individual species.

There are no existing catch documentation requirements in place for Spiny Dogfish apart from those that may be related to catch returns and quota monitoring in some range States. The development of CITES permits would not, therefore, need to reflect or take into account existing documentation requirements.

It is important that countries are in a position to apply the appropriate CITES requirements to Spiny Dogfish product. It is known, for example, that the USA imports Spiny Dogfish product from Canada for processing. The USA also processes domestically caught product. Depending on the potential for imported and domestic product to be mixed during processing operations, it may be potentially problematic for the USA to determine whether an export permit or a re-export permit is required for the processed product. The same issue may arise, albeit on a smaller scale, in the EU when imported and EU-caught product is processed and exported. Individual States will need to address such chain of custody issues.

POTENTIAL BENEFITS OF A CITES LISTING

The stated rationale for the listing of Spiny Dogfish in Appendix II of CITES is that the species is subject to unsustainable fishing in several parts of its range and that there is strong international demand for the species (Anon., 2006). The analysis in this report suggests that a CITES listing has the potential to encourage sustainable management in most existing fisheries and to arrest the current serial depletion of Spiny Dogfish stocks globally by ensuring that new species for the species are conducted sustainably.

A CITES listing may encourage improvements in the conservation and management of Spiny Dogfish. This may come about because: a CITES listing would require that non-detriment findings and legal findings be made in relation to exports of Appendix II-listed species; of the consequent need for Parties harvesting the same stock to agree on common criteria for such findings; and because of the requirement that CITES Parties provide annual reports on the nature and extent of their trade in listed species, based on CITES permits and certificates granted.

The potential benefits of a CITES listing of Spiny Dogfish may therefore include:

- the introduction and enforcement of more comprehensive and precautionary management measures in existing fisheries for Spiny Dogfish;
- where stocks of Spiny Dogfish are shared, the development of complementary or joint management arrangements by the responsible management agencies, that cover the entire stock;
- the prevention of the current serial depletion of Spiny Dogfish populations globally; and
- improvements in data on the nature, extent and pattern of trade, to support catch data.

Each of these potential benefits is examined below.

Management of Spiny Dogfish fisheries

The section of this report on management of Spiny Dogfish has shown that, in relation to most major fisheries for the species:

- management has been implemented too late to prevent over-fishing;
- management measures have been inadequate to prevent over-fishing or to provide for rebuilding of over-fished stocks;
- there is a lack of control over the full range of the stock either between jurisdictions within national borders, or between States sharing the same stock; and/or
- the level of catch is uncertain because of poor identification and/or recording at the species level and a lack of species-specific trade codes in all but two of the major traders

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An Appendix-II listing would require all exporters, that are CITES Parties, or who wish to export Spiny Dogfish products to a CITES Party, to make non-detriment and legal findings (or equivalent findings in the case of non-Parties) in respect of any domestically-caught product. Re-export certificates would also be required for any product that is imported by a CITES Party and subsequently re-exported (regardless of whether it was subject to further processing or not).

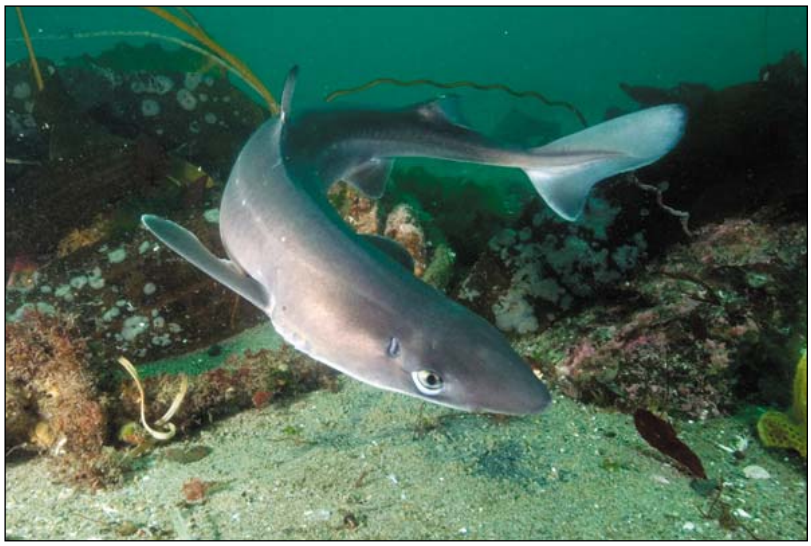
The EU, USA, Canada, New Zealand and Norway all have significant levels of trade in Spiny Dogfish. Of these, the EU is a major importer and a minor exporter, the USA is a major exporter and, to a lesser extent an importer (of product for processing), and Canada, New Zealand and Norway are all significant exporters.

Owing to stricter measures under EU regulations, as an importer of an Appendix II-listed species, the EU would require the prior presentation of an import permit as well as an export/re-export permit or equivalent for imported Spiny Dogfish product. For imported products, the USA would require only export permits from the originating country.

Each of the major exporting countries would be required to issue export/re-export permits in respect of their exports. Thus, non-detriment findings would need to be made in respect of each of the major fisheries for Spiny Dogfish. Given that fisheries in Canada, the USA, New Zealand and Norway have limited domestic markets for Spiny Dogfish, and rely heavily on the EU market for their product, there would appear to be a strong incentive for these countries to ensure that domestic management measures and compliance with those measures is adequate to underpin a non-detriment finding. It is apparent that at least some fisheries in the Northwest Atlantic are not being managed in accordance with scientific advice and, in other fisheries, it is questionable whether, in the absence of scientific advice, authorities are taking a sufficiently precautionary approach. The need to issue a non-detriment finding or the prospect of the Scientific Authority imposing limits on exports of the listed species, would focus the attention of managers and industry on ensuring that management measures were precautionary and consistent with the long-term sustainability of the stock.

In other fisheries, such as those off South Africa, Namibia, South America and possibly Morocco, there is no management of either target or by-catch fisheries, and landings and discards are not well recorded. The status of the southern African stock is unknown but there is evidence of declines in the abundance of the South American stock (Massa *et al.*, 2002). A CITES listing has the potential to address or prevent over-exploitation of the fisheries developing for Spiny Dogfish in these areas. Spiny Dogfish product is known to be exported from Namibia, Morocco and Argentina to CITES Parties. Continuation of these exports would depend on the exporter being in a position to make non-detriment findings in respect of their catch. If the imperative to export the product is strong enough this may induce such countries to introduce effective management arrangements or to reduce their catch of the species. Where the latter option is taken, the conservation impact will depend on the extent to which the catch was a result of directed fishing or by-catch. If it is predominantly by-catch, then the impact may simply be to reduce landings and increase discards with no improvement in management or recording of mortalities.

The Northeast Atlantic stock supplied around 38% of the global recorded catch in 2004 (see **Table 2**). As discussed in the previous section, CITES provisions apply only to product that enters international trade and, potentially, a CITES listing may have less of an impact on conservation and management of the Northeast Atlantic stock since much of it is consumed within the EU and does not enter international trade. There is, however, a relatively low level of exports of EU Spiny Dogfish products (in recent years between 30 and 55 t annually) and continuation of these exports would require non-detriment findings to be made by EU Member States and, therefore, oblige EU Member States to establish adequate management arrangements. If, however, EU exporters chose to forgo exports in the face of CITES' requirements for non-detriment findings, this would effectively quarantine catches by EU Member States for internal consumption from CITES provisions and this stock would be excluded from the potential conservation benefits of an Appendix-II listing.



Credit: © Andy Murch/SeaPics.com

An agile Spiny Dogfish turns on its tail

A non-detriment finding for Spiny Dogfish will need to ensure that the management arrangements adequately take into account all mortalities, whether through landings or discards, and, where management arrangements regulate for the recording of discards, that these regulations are complied with; that is, that the catch is taken legally. While the survival rate of Spiny Dogfish discards is considered relatively high, it remains important that mortalities associated with discards are accounted for. If a non-detriment finding cannot be made because of lack of recognition, quantification or management of discards or compliance with discard regulations then it is possible in the short term that discards may be increased. This could arise where the major market was international and there were limited alternative opportunities for domestic use of the product. In the longer term, the management agencies have the option of introducing management arrangements which address deficiencies identified by the Scientific and/or Management Authority and provide for conditions for an export permit to be met. This improved management would be a positive outcome of a CITES listing.

Whole of stock management

Currently, significant gaps exist in the management of Spiny Dogfish stocks. In the Northeast Atlantic less than 10% of the catch is subject to management under the Common Fisheries Policy. While the TAC for a limited portion of the stock is set jointly between the EU and Norway, EU Member States have unfettered access to stocks in other areas of EU waters and others, such as the Faeroe Islands and Iceland, fish the same stock.

In the Northwest Atlantic and Northeast Pacific, the USA and Canada fish the same stocks. One of the objectives of the US Interstate Fishery Management Plan (IFMP) for Spiny Dogfish on the Atlantic Coast is to co-ordinate management activities between State, federal and Canadian waters to ensure complementary regulations throughout the species's range (ASMFC, 2006). The US stock assessment for the Spiny Dogfish in the Northwest Atlantic has found Canadian catches to be unsustainable (Roberts, 2005). Canada, however, has declined to participate in a transboundary assessment until an initial assessment of the stock in Canadian waters has been made (ASMFC, 2006). Recent action by the Atlantic States Marine Fisheries Commission (ASMFC) to increase quotas and trip limits may further compromise attempts by the USA to engage Canada in joint assessment and management.

Similar situations exist in relation to the South American stock (Argentina, Brazil and Uruguay) and the Southern African stock (South Africa and Namibia).

The capacity to issue a non-detriment finding in relation to shared stocks will require that a Scientific Authority takes into account all catch, effort and management arrangements in place for that stock. Lack of, or inadequate management of part of, a stock can compromise the sustainability of the whole. An Appendix-II listing would encourage those exploiting shared stocks to develop consistent criteria for assessment of stocks and complementary management arrangements. This approach would be consistent with the requirements of Parties to the United Nations Fish Stocks Agreement to co-operate to manage straddling stocks. Ultimately, whole of stock management will contribute to better conservation outcomes.

Arresting serial depletion of Spiny Dogfish stocks

The serial depletion of Spiny Dogfish stocks to meet demand for Spiny Dogfish meat in Europe is evidenced by the sequential development of fisheries in the USA and Canada. As regulators in the USA imposed restrictions on catch, the European demand for meat and the demand from the US processing sector for product provided the incentive for the development of the Canadian fishery. Canadian landings increased six-fold in the period 1997 to 2001 as the US regulations went into effect (IUCN, 2006).

As noted above, the potential exists for unmanaged fisheries off South America, Southern Africa and Morocco to expand in response to strong European demand and attractive market prices, as global catches decline or are constrained. In particular, there is scope for product currently taken as by-catch and discarded, with a relatively high survival rate in some instances, to instead be retained and for mortalities to be increased as a result. There is, therefore, potential for continuation of the pattern of serial depletion of stocks. A CITES listing would ensure that where such product was retained for export, the management arrangements were such that this catch was not detrimental to the survival of those stocks. As discussed above, a CITES listing has the capacity to influence the manner in which these fisheries are managed and to prevent a repeat of past mistakes in the development of Spiny Dogfish fisheries.

Improving data on catch or trade of Spiny Dogfish

The value of accurate trade data for conservation of marine species lies in their role as a means of confirming landings and providing an indication of compliance with catch limits. In addition, enhanced trade data allow new players in the catch and trade of species and trends in trade to be identified. Trade data will not of course provide any insights into mortalities arising from discards, from recreational catches or from catch for domestic consumption.

Currently, there is considerable catch of Spiny Dogfish that is recorded in generic 'shark' categories. In some countries, even this level of reporting is not in place. A number of significant trading countries (e.g. Morocco, Argentina, Iceland and Mauritania) fail to report catch of Spiny Dogfish to FAO. In addition to deficiencies in the quality and reporting of Spiny Dogfish catch data, there are currently limited species-specific trade data available. Only the EU and the USA have codes specific to Spiny Dogfish and even these codes apply only to some meat products. Fillets, for example, are recorded under categories not specific to Spiny Dogfish and there is no recording at a species level of smoked product or of other derivatives of Spiny Dogfish such as fins, skins and livers.

The lack of available trade data for Spiny Dogfish, and concerns about the comprehensiveness of catch data reported to FAO, mean that, in the absence of a CITES listing, there is no reliable mechanism to track trends in catch and trade of the species. An Appendix-II listing would provide a mechanism to establish more reliable estimates of catch and trade.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

There are few positive signs in the management landscape for Spiny Dogfish. Management is reliant largely on unilateral action by fishing States and to date that action has failed to prevent over-fishing and failed to achieve rebuilding. The potential exists for development of new Spiny Dogfish fisheries and further serial depletion of Spiny Dogfish stocks. The high proportion of catch taken in by-catch rather than directed fisheries means that there is little likelihood that fishers will have the incentive to demand or support more rigorous management of the stocks by authorities since most are not economically dependent on the species. To date, most management authorities and industry have proven reluctant to take strong management action despite clear scientific advice that such action is required. In the absence of a CITES listing, there is no apparent incentive to improve management of most Spiny Dogfish stocks.

A CITES Appendix-II listing would provide that incentive by allowing for broad-based action to be taken where management is considered inadequate. A listing would allow the CITES membership to take action to provide assistance to a Party that currently had limited capacity to make non-detriment findings for marine species or, ultimately, to suspend trade in the species with a country that makes non-detriment findings inconsistent with the biological status of the stock or allows the export of product taken illegally.

CITES Parties are required to implement the provisions of CITES in relation to listed species, unless a Party takes out a reservation in relation to that species. In order to continue to export Spiny Dogfish products, Parties need to be in a position to declare non-detriment findings and that the product was taken legally. These obligations place pressure on catching countries to ensure that not only their own management arrangements are sustainable and enforceable, but that others catching the same stock are implementing and enforcing equally rigorous conservation and management measures. Under an Appendix-II listing, failure to improve management and ensure whole of stock management will, given the very high proportion of catch traded internationally and the very high proportion of that trade conducted between CITES Parties, result in the inability to dispose of product on the lucrative international market and ultimately the economic failure of target fisheries for the species. In addition, an Appendix-II listing will provide pressure for compliance with domestic management arrangements and will address, for example, the situation in the USA where State management arrangements can undermine federal measures.

This report has identified a number of factors which may constrain the effectiveness of a listing of Spiny Dogfish in Appendix II of CITES. One of those is that a CITES listing may have a limited impact on management of the Northeast Atlantic stock of Spiny Dogfish. While catch of that stock represents around 40% of global reported catch this should not be considered the defining factor in determining the effectiveness of a CITES listing. Regardless of the level of catch taken from a stock, or the size of a stock, each stock is equally important in terms of its conservation and management. Most, if not all other Spiny Dogfish stocks currently exploited

commercially, service export markets and will be subject to CITES provisions. The analysis in this report suggests that the fact that one of the global stocks of Spiny Dogfish may not be subject to CITES provisions does not outweigh the potential benefits that a CITES listing could provide to other stocks.

Similarly, the analysis of the other implementation issues identified suggests that none are likely to render a listing ineffective, but some may potentially compromise its effectiveness. Implementation of the recommendations below would mitigate the impact of these factors and assist in realising the potential benefits available from a decision to list Spiny Dogfish in Appendix II of CITES.

Recommendations

A) If Spiny Dogfish is listed in Appendix II of CITES, the following recommendations should be adopted:

Identification of Spiny Dogfish products

Recommendation 1: Catching countries should ensure that fishers are provided with identification guides to assist with correct identification of Spiny Dogfish. The feasibility of producing effective identification guides that assist in the correct identification of the major forms in which Spiny Dogfish is traded internationally (backs, belly flaps, trunked) should be investigated and such guides developed if they are considered effective.

Recommendation 2: A species-specific DNA test for identification of Spiny Dogfish products should be developed as a priority in order to provide conclusive advice where doubts arise as to the species origin of a product or where laundering is known to have been occurring.

Recommendation 3: CITES Parties should acknowledge the potential for some laundering of Spiny Dogfish to occur owing to the existence of a range of look-alike products by identifying the high risk areas and establishing a monitoring programme to detect the extent of the problem in those areas. If the monitoring programme identifies particular species that are being used to by-pass CITES provisions for Spiny Dogfish, consideration should then be given to listing those species in Appendix II.

Development of common criteria for non-detriment findings

Recommendation 4: Range States conducting fisheries for shared stocks should develop, as a priority, a common understanding regarding the basis for non-detriment findings for those stocks. Effective implementation of CITES provisions will require the development of complementary management measures and co-operation in relation to stock assessment, catch monitoring and compliance with management arrangements.

Capacity to implement CITES provisions

Recommendation 5: Where CITES Parties identify a lack of capacity by other Parties to implement CITES provisions effectively, those in a position to do so should assist with the development of practical and cost-effective mechanisms to support implementation of CITES provisions.

Chain of custody issues

Recommendation 6: CITES Parties should implement processes to ensure that Spiny Dogfish products of domestic and imported origin are clearly differentiated in the processing chain so that the Party can issue the correct CITES documentation in respect of products.

Introduction from the Sea

Recommendation 7: If Spiny Dogfish is listed in Appendix II of CITES, the Parties should monitor any use of the 'introduction from the sea' provision and, if required, take the necessary steps to preclude the landing of any specimens taken outside the jurisdiction of a State.

B) Regardless of whether Spiny Dogfish is listed in Appendix II of CITES, the Parties should adopt the following recommendations:

Recommendation 8: All Parties to CITES that are significant catchers and traders of Spiny Dogfish should ensure that their domestic management measures support sustainable management of Spiny Dogfish stocks under their jurisdiction.

Recommendation 9: All trading countries should introduce species-specific codes for Spiny Dogfish products and ensure that these allow the identification of all the major forms in which the species is traded.

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NOTES

1 The term ‘shark’ is taken to include all species of sharks, skates, rays and chimaeras (Class Chondrichthyes).

2 CITES Resolutions and Decisions can be found at www.cites.org.

3 *Squalus acanthias* is known by a number of common names. In Europe it is known as Spurdog, FAO refers to the species as Piked Dogfish, while elsewhere it is known mainly as Spiny Dogfish. This report has used Spiny Dogfish as the common name for the species.

4 This section draws heavily on Anon. (2006).

5 Further references in this report to Spiny Dogfish stocks or locations of Spiny Dogfish fisheries reflect FAO Fisheries Areas

6 NAFO Area 3Ps is within the Canadian Exclusive Economic Zone.

7 This concept, and its application to Spiny Dogfish, is explored in the section of this report dealing with issues associated with an Appendix-II listing of Spiny Dogfish.

8 See CITES *Resolution Conf. 9.24*, available at www.cites.org/eng/res/all/09/E09-24.pdf

9 Taiwan is ineligible to join CITES, but voluntarily implements CITES provisions.

ACRONYMS

ASMFC	Atlantic States Marine Fisheries Commission
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CoP	meeting of the Conference of the Parties to CITES
CPUE	Catch-per-unit-effort
DFO	Department of Fisheries and Oceans
DGPA	Directorate General for Fisheries and Aquaculture
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
ICES	International Council for the Exploration of the Sea
IFMP	Interstate Fishery Management Plan
IUCN	The World Conservation Union
NAFO	Northwest Atlantic Fisheries Organization
NEFSC	Northeast Fisheries Science Center
NMFS	National Marine Fisheries Service
RFMO	Regional Fisheries Management Organization
TAC	Total Allowable Catch
UNCLOS	United Nations Convention on the Law of the Sea
WGEF	Working Group on Elasmobranch Fisheries

TRAFFIC, the wildlife trade monitoring network, works to ensure that trade in wild plants and animals is not a threat to the conservation of nature. It has offices covering most parts of the world and works in close co-operation with the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

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