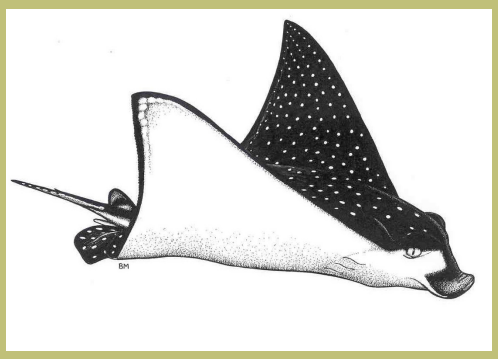
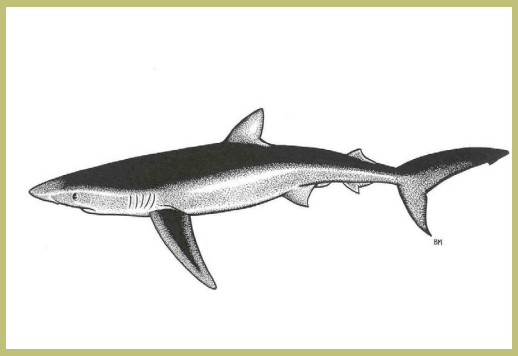
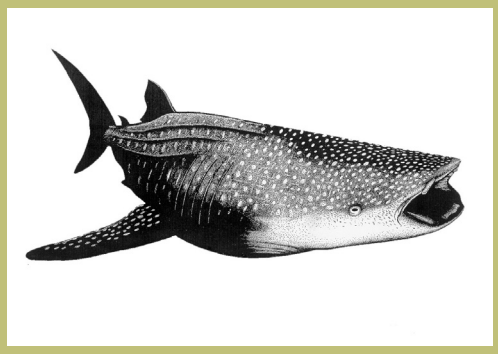
TRENDS IN GLOBAL SHARK CATCH AND RECENT DEVELOPMENTS IN MANAGEMENT







by

Mary Lack and Glenn Sant

TRAFFIC®
the wildlife trade monitoring network

Published by TRAFFIC International, Cambridge, UK.

Suggested citation: Lack, M. and Sant, G. (2009). *Trends in Global Shark Catch and Recent Developments in Management.* TRAFFIC International.

Front cover illustrations: Spotted Ray *Raja montagui*, Blue Shark *Prionace glauca* and Whale Shark *Rhincodon typus*

Illustration credits: Bruce Mahalski

UK Registered Charity No. 1076722

Trends in Global Shark Catch and Recent Developments in Management

Mary Lack[1] and Glenn Sant[2]

May 2009

[1] Shellack Pty Ltd
[2] Global Marine Programme Leader, TRAFFIC

INTRODUCTION

In 2006, 2007 and 2008 TRAFFIC reported on total shark[3] catch and the top 20 shark-catching countries (Lack and Sant, 2006; Anon, 2007; Lack and Sant, 2008). Those analyses have been based on the Fishstat Capture Production Database of the Food and Agriculture Organization of the United Nations (FAO). The purpose of these analyses has been to monitor overall trends in shark catch and to identify the main shark-catching countries.

TRAFFIC's focus on shark catch has been prompted by the growing international concern for the status of shark stocks. This concern stems from the recognized vulnerability of sharks to overfishing because of their slow growth and their relatively late age of maturity and low fecundity. In addition, many species of sharks are top order predators and play an important role in marine ecosystems and it is only through the adoption of ecosystem-based management (EBM) principles, including the application of the precautionary approach, that shark species can be managed sustainably and unintended ecosystem effects avoided.

The need for better management of sharks has been expressed by organizations including the United Nations General Assembly (UNGA), the FAO, the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Parties to the Convention on Migratory Species (CMS). In 2000, the FAO developed the *International Plan of Action for the Conservation and Management of Sharks* (IPOA-Sharks). However, implementation of this voluntary plan through the development of National Plans of Action (NPOAs) has been patchy, in terms of both the number of countries adopting NPOAs and the quality of those plans.

Despite the high level of international concern, approximately 17% of shark and ray species are now listed in the Critically Endangered, Endangered and Vulnerable categories of the IUCN's Red List of Threatened Species (IUCN, 2008) and a further 47% are listed as Data Deficient (Polidaro *et al.,* 2008).

Analysis of trends in catch, and those responsible for that catch, therefore remains a critically important element of attempts to promote better management of sharks. Ideally, such assessments would also be species-based. However, the species-specific data reported to the FAO on global shark catch is limited and this restricts the extent to which a meaningful assessment of trends in catch of particular shark species can be made from the FAO database. Interpretation of trends in global catch data is also affected by changes in the nature of management practices for sharks and associated species, changes in the nature and level of reporting of shark catch to FAO[4] and changes in abundance of shark stocks. As a consequence, it remains very difficult to draw definitive conclusions about trends in global shark

[3] Sharks refer to all species of sharks, rays, skates and chimaeras (Class *Chondrichthyes*).
[4] As discussed by FAO in Appendix VI to FAO (2009a).

fisheries globally from the data available. The analysis of the available data presented in this paper must be considered in that context.

The FAO's database has recently been updated to include 2007 data and TRAFFIC has repeated its analysis to identify the top shark-catching countries. However, a revised methodology has been adopted to minimize the impact of inter-annual variability in shark catch on the group of top shark-catching countries. It is hoped that this methodology will result in a more meaningful identification of those countries that consistently account for the highest proportion of reported global shark catch.

REPORTED WORLD SHARK CATCH

Species and species groups

The FAO Fishstat Capture Production database reports capture production of sharks for 100 shark species and a further 30 groups. While there appears to have been some improvement in the level of species-specific reporting in recent years, most shark catch remains recorded in generic shark categories. In 2007, only 20% of the shark catch data reported to FAO was reported on a species basis (up from 15% in 2003). The remaining 80% was reported as various groupings of shark species with over 35% in the single category of "Sharks, rays, skates etc nei[5]" and a further 18% in the "Rays, stingrays, mantas nei" category.

Total reported shark catch peaked at just under 900 000 t in 2003, then declined to 750 000 t in 2006 before increasing to 780 000 t in 2007. Trends in catch by species and generic shark categories in the period 2000 to 2007 are shown in **Table 1**. Notable trends in the species-specific data over that period include that reported catch of:

- Blue Shark *Prionace glauca* continued to increase with catch more than doubling to reach 45 000 t in 2007
- Spiny Dogfish *Squalus acanthias* halved from 32 000 t to around 16 000 t
- Leafscale Gulper Shark *Centrophorous squamosus* has fallen from over 3000 t in 2000 to 570 t in 2007
- Pacific Guitarfish *Rhinobatus planiceps* fell from 2600 t to 20 t in 2006 and no catch was reported in 2007
- Portuguese Dogfish *Centroscymnus coelolepis* fell from over 4000 t in 2004 to just over 700 t in 2007
- Silky Shark *Carcharhinus falciformis* fell from over 11 000 t in 2000 to around 2500 t in 2007.

[5] Nei refers to 'not elsewhere included'

In the generic shark categories, reported catch of:

- "Sharks, rays, skates, etc nei" fell from 413 000 t in 2003 to 291 000 t in 2007
- "Various sharks nei" fell from 33 000 t in 2000 to 783 t in 2007
- "Rays, stingrays, mantas nei" peaked at 221 000 t in 2003, but had fallen to 139 000 t by 2007
- "Dogfish sharks nei" increased from 9000 t to 19 000 t, while "Dogfishes and hounds nei" fell from around 3000 t to around 1200 t
- "Raja rays nei" increased from around 6300 t in 2000 to just under 45 000 t in 2007
- "Mantas, devil rays nei" increased from 900 t to over 3300 t
- "Thresher sharks nei" increased from just over 500 t to around 16 000 t in 2007
- "Hammerhead sharks etc nei" increased from around 2000 t to over 3600 t.

As noted above, trends in the data are, however, difficult to interpret. It is unclear, for example, whether a decline in reported catch of a species represents a decline in abundance, deterioration in reporting of catch data or improvements in species identification which results, over time, in transfer of reported catch from generic categories to species categories. Further, declines in overall shark catch may reflect the impact of stricter national and/or regional controls on shark catch and by-catch, or on fisheries for species in which sharks are taken as by-catch.

Table 1: Capture production of sharks 2000–2007 (t)

	2000	2001	2002	2003	2004	2005	2006	2007
Species								
Angelshark	20	22	16	41	10	14	36	15
Angular roughshark	33	63	86	144	79	38	54	106
Antarctic starry skate	36	7	24	18	13	54	1	16
Arctic skate	.	.	.	5	<0.5	-	-	2
Argentine angelshark	3375	4071	3189	3756	4096	4097	4516	4512
Atlantic sharpnose shark	<0.5	-	-	-	-	139	146	173
Basking shark	389	287	180	505	239	291	25	89
Bigeye thresher	112	48	71	116	163	301	223	310
Birdbeak dogfish	46	117	188	189	417	386	275	179
Black dogfish	271	271	27	53	56	4	6	12
Blackmouth catshark	45	34	338	267	248	227	283	312
Blacktip shark	651	545	97	41	469	570	194	69
Blonde ray	.	.	.	1	-	123	384	425
Blue shark	19 241	21 126	24 780	31 692	37 660	37 546	41 141	45 087
Blue skate	866	817	561	593	661	502	421	386
Bluntnose sixgill shark	-	1	7	2	30	19	16	6
Bramble shark	.	1	-	-	3	1	<0.5	1
Broadnose sevengill shark	4	5	4	5	2	2	2	11
Brown ray	-	-	-	-	-	-	1	-
Brown smooth-hound	3	4	3	2	2	4	3	1
Bull shark	<0.5	-	-	-	<0.5	<0.5	-	1
Cape elephantfish	380	405	422	524	559	645	749	702
Chola guitarfish	4	<0.5	2	3	1	5	16	1
Common eagle ray	2	2	-	2	2	2	2	1
Common stingray	4	11	-	-	-	-	-	2
Copper shark	25	39	38	27	25	17	16	36

	2000	2001	2002	2003	2004	2005	2006	2007
Crocodile shark	-	-	-	-	-	-	-	7
Cuckoo ray	3064	2885	2742	2843	2759	3057	2528	2470
Dark ghost shark	1819	1572	2055	2554	1793	2170	1669	2154
Dark-belly skate	<0.5	-	-	<0.5	-	-	-	-
Devil fish	-	-	-	-	1	3	3	2
Dusky catshark	-	-	<0.5	-	-	-	-	-
Dusky shark	80	<0.5	3	10	<0.5	<0.5	<0.5	<0.5
Dusky smooth-hound	334	321	493	498	517	257	239	328
Eaton's skate	5	<0.5	1	24	9	7	<0.5	7
Ghost shark	1310	1294	1188	1146	1303	1354	1307	1471
Giant guitarfish	40	56	44	134	157	125	72	29
Great white shark	3	<0.5	<0.5	4	<0.5	8	<0.5	<0.5
Greenland shark	45	58	57	65	70	61	35	5
Gulper shark	143	251	404	930	674	172	262	167
Kerguelen sandpaper skate	-	-	-	2	4	1	8	2
Kitefin shark	628	564	560	1,213	1,137	927	476	349
Knifetooth dogfish	-	-	-	-	11	48	124	320
Leafscale gulper shark	1965	1922	3072	3023	2661	1139	853	569
Lemon shark	-	-	-	-	1	-	-	<0.5
Little sleeper shark	.	.	2	1	1	<0.5	3	3
Longfin mako	4	3	3	1	1	2	3	2
Longnose spurdog	-	-	-	-	-	-	-	21
Longnose velvet dogfish	1	3	17	514	302	161	421	150
Longnosed skate	140	89	210	198	43	49	52	78
Longtail stingray	.	.	.	.	.	.	39	135
Lowfin gulper shark	-	-	-	-	-	-	<0.5	218
McCain's skate	-	-	-	<0.5	<0.5	1	-	<0.5
Mouse catshark	-	-	-	-	-	-	5	.
Murray's skate	<0.5	-	-	1	<0.5	2	-	1
Narrownose smooth-hound	8157	10 766	8140	8895	8748	8636	10266	9858
Nurse shark	407	89	24	114	80	62	19	633
Nursehound	274	264	207	266	208	415	578	628
Oceanic whitetip shark	638	534	203	174	187	78	76	14
Pacific angelshark	-	-	-	-	81	777	801	786
Pacific guitarfish	2624	1060	822	260	28	184	20	.
Pacific sleeper shark	-	-	3	3	8	2	<0.5	2
Pelagic thresher	.	.	.	.	.	.	280	2,556
Picked dogfish	31 731	28 274	27 887	22 288	20 610	19 331	16 143	16 605
Plownose chimaera	2044	1586	880	2530	2943	2547	1900	2071
Porbeagle	2872	2136	1018	1065	1377	1000	826	887
Portuguese dogfish	1868	3248	3716	4232	4021	2297	1286	724
Rabbit fish	15	122	69	169	617	344	88	152
Sailfin roughshark	-	-	1	-	1	-	-	2
Sailray	-	-	-	10	8	20	-	-
Sand tiger shark	1	8	8	3	4	5	1	<0.5
Sandbar shark	41	24	28	21	34	58	102	142
Sandy ray	369	330	302	299	282	351	301	298
Scalloped hammerhead	262	515	798	424	491	328	224	202
Shagreen ray	65	105	102	63	56	49	43	57
Sharpnose stingray	4	37	22	68	25	20	39	42
Sharptooth houndshark	-	-	-	-	-	-	-	6
Shortfin mako	2864	3359	5630	6313	5160	5513	5809	5769
Silky shark	11 680	9330	8712	5275	4358	3254	2963	2485
Small-eyed ray	-	-	-	13	16	23	19	20
Small-spotted catshark	6182	7072	6479	5917	5915	6248	5791	6224
Smalltail shark	192	114	306	.	.	130	10	.
Smooth hammerhead	37	27	40	119	207	298	183	319
Smooth-hound	15	76	58	86	163	281	243	296
Southern stingray	.	.	.	.	.	101	105	100
Spiny butterfly ray	2	2	4	6	4	6	9	21

	2000	2001	2002	2003	2004	2005	2006	2007
Spot-tail shark	9005	8976	8071	11 689	13 298	14 086	13 516	11 821
Spotted estuary smooth-houn	1643	1563	1403	1488	1344	1467	1373	1335
Spotted ratfish	-	-	2	-	-	<0.5	<0.5	<0.5
Spotted ray	1341	1563	1451	1435	1312	1220	1098	1102
Starry ray	1076	1211	1781	1492	1015	660	512	473
Starry smooth-hound	<0.5	<0.5	2	5	8	10	22	30
Straightnose rabbitfish	-	2	1	-	-	-	-	-
Thornback ray	1277	1296	1263	1863	1569	1569	1656	1962
Thresher	654	614	427	468	321	418	411	448
Tiger shark	-	2	13	48	50	87	81	61
Tope shark	4367	4318	4335	4568	5123	5361	5053	4991
Velvet belly	-	-	3	10	11	51	5	16
Whip stingray	5388	4312	4512	4842	4700	5207	5235	-
Whitespotted wedgefish	.	.	.	.	.	28,492	17,945	17,970
Total by species	**132 183**	**129 829**	**129 607**	**137 668**	**140 562**	**165 517**	**151 641**	**152 051**
Groups								
Angelsharks, sand devils nei	596	618	692	505	465	592	483	376
Bathyraja rays nei	1	-	-	14	<0.5	3	<0.5	1
Catsharks, etc. nei	-	-	-	-	10	4	76	383
Catsharks, nursehounds nei	525	508	339	435	1,202	978	661	679
Dogfish sharks nei	9228	9379	6,126	7062	6854	21 340	18 918	19 474
Dogfish sharks, etc. nei	-	-	-	-	-	-	-	-
Dogfishes and hounds nei	2987	2666	3008	1472	1491	1256	1126	1212
Eagle rays nei	10	14	21	29	50	1,067	4,891	5,840
Elephantfishes, etc. nei	-	-	-	-	6	-	-	-
Guitarfishes, etc. nei	4229	3808	3128	1914	2068	1857	2088	1873
Hammerhead sharks, etc. nei	2053	2282	2088	1773	1037	2791	3519	3645
Houndsharks, smoothhounds nei	27	134	56	21	17	160	23	11
Lanternsharks nei	-	4	124	99	73	75	50	133
Mackerel sharks, porbeagles nei	.	.	.	.	250	272	1363	1460
Mantas, devil rays nei	931	106	110	100	802	635	2791	3310
Raja rays nei	63 381	58 035	48 665	51 943	47 769	38 709	40 859	44 901
Ratfishes nei	1548	3032	2553	2273	2003	1354	1,126	1249
Rays and skates nei	-	-	-	-	<0.5	1	<0.5	26
Rays, stingrays, mantas nei	182 806	180 824	190 509	220 985	209 663	143 200	134 524	139 130
Requiem sharks nei	38 753	38 767	40 871	37 703	36 590	42 554	53 790	53 284
Sawsharks nei	270	423	371	459	519	511	499	386
Sharks, rays, skates, etc. nei	403 357	382 641	399 498	413 630	373 450	292 534	276 303	291 265
Stingrays nei	10	7	10	11	14	20	13	8
Stingrays, butterfly rays nei	3	2	2	5	31	26 948	29 073	30 561
Smooth-hounds nei	12 467	13 145	15 346	9790	13 657	14 473	12 157	13 037
Thresher sharks nei	519	599	491	763	548	13 986	15 406	15 883
Various sharks nei	32 930	32 927	19 503	10 861	1742	398	346	783
Mako sharks	116	47	117	107	90	123	163	153
Sawfishes	82	45	27	73	29	11	32	21
Torpedo rays	65	78	68	76	92	82	103	98
Total by group	**756 894**	**730 091**	**733 723**	**762 103**	**700 522**	**605 934**	**600 383**	**629 182**

Source: FAO (2009b)

Catching countries

Previously, TRAFFIC's analysis of the FAO Capture Production data relied on a snapshot of catch by country in the most recent year for which data were available. While this analysis was useful, there is considerable inter-annual variability in the catch of shark in some countries. After reviewing these previous analyses, it became apparent that in any given year some countries may be either just within or

just outside the top 20 countries. This reduces the usefulness of the list as an indicator of the key catching countries. In order to minimize the impact of this inter-annual variability, and to more clearly identify those countries that consistently catch substantial quantities of shark, TRAFFIC has adopted a revised methodology. The average catch data by country over three statistically convenient time periods: 1980–1989; 1990–1999; and 2000–2007 have been analysed. The top 20 catching countries in 2007 alone are listed in **Annex 1** for comparison with earlier analyses.

Catch by each country reporting shark catch data to FAO over the period 1980–2007 was averaged for each of the three time periods. The top 20 catchers, on average over each time period, were then identified. The results of the analysis for each of the three time periods are presented in **Table 2**. Across the three time periods, a total of 23 countries/territories were categorized as top 20 in one or more of the three time periods. Of those, 15 catching countries/territories (in bold) appear in the top 20 in each of the three time periods, and a further two (in italics) appear in the two most recent time periods. These 17 countries/territories are considered to represent the key shark catchers.

Using the average catch in the most recent period, 2000–2007, as representing the most current assessment of the relative standing of these 17 catchers, they are ranked as described in **Table 3**.

Table 2: Top 20 catching countries/territories, 1980–2007, by time period

Country/territory	In top 20?		
	1980–89	1990–99	2000–07
Argentina	YES	YES	YES
Brazil	YES	YES	YES
Canada	NO	NO	YES
France	YES	YES	YES
India	YES	YES	YES
Indonesia	YES	YES	YES
Iran, Islamic Rep. of	NO	NO	YES
Japan	YES	YES	YES
Korea. Rep. of	YES	YES	NO
Malaysia	YES	YES	YES
Mexico	YES	YES	YES
New Zealand	NO	YES	YES
Nigeria	YES	NO	YES
Pakistan	YES	YES	YES
Peru	YES	YES	NO
Philippines	YES	YES	NO
Portugal	NO	YES	YES
Spain	YES	YES	YES
Sri Lanka	YES	YES	YES
Taiwan	YES	YES	YES
Thailand	YES	YES	YES
Russian Federation	YES	NO	NO
UK	YES	YES	YES
USA	YES	YES	YES

Table 3: Average catch of key shark catchers, 2000–2007 (t)

Rank	Country/territory	Av. Catch 2000–2007
1	Indonesia	110 528
2	India	70 758
3	Spain	57 685
4	Taiwan	48 493
5	Mexico	34 535
6	Pakistan	34 270
7	Argentina	33 639
8	USA	29 909
9	Japan	25 930
10	Malaysia	24 500
11	Thailand	24 156
12	France	22 328
13	Sri Lanka	22 029
14	Brazil	20 498
15	New Zealand	18 260
16	Portugal	15 137
17	UK	14 301

The FAO shark catch data for each of the 17 key catchers in the period 2000–2007 was then analysed to identify trends in catch of shark species or species groups. That analysis revealed that seven of the key catchers provide very limited species breakdown of their shark catch. Specifically:

- India, the second-highest catcher in the 2000–2007 period, records all of its catch in the single generic category "Sharks, rays, skates etc nei".
- Pakistan's catch is reported in only three categories "Guitarfishes etc nei", "Rays, stingrays, mantas nei" and "Requiem sharks nei"
- Japan reported catch against only two categories, "Sharks, rays, skates etc nei" and Whip Stingray *Dasyatis akajei*. In 2007, all of Japan's catch was recorded in the "Sharks, rays, skates etc nei" category
- The shark catch of Malaysia, Taiwan and Thailand is reported in only two categories: "Sharks, rays, skates etc nei" and "Rays, stingrays, mantas nei"
- Sri Lanka's catch is reported against only two categories "Sharks, rays, skates etc nei" and Silky Shark.

The remaining 10 catchers provide species-specific shark catch data to varying degrees, although some, notably Argentina, Brazil, Spain and the USA, still report a large proportion of their catch under various generic shark categories. The data do, however, demonstrate the marked improvement in species level reporting by Indonesia and Mexico, in particular, since 2005.

The catch data available also provide some insights into trends in catch by species or species groups in the key catching countries. For example:

- The increase in Argentina's shark catch is made up largely of increased catch of "Rays, stingrays, mantas nei", which doubled 2000–2007.

- In France, there has been a marked decline in the catch of “Dogfish sharks nei” and Spiny Dogfish.
- In Portugal, the catch of Blue Shark has doubled since 2000 while the catch of Leafscale Gulper Shark has declined by around 80% since 2002 and catch of Portuguese Dogfish by over 73% since 2000. At the same time, the catch of Shortfin Mako *Isurus oxyrinchus* has more than trebled since 2000.
- In Spain, the catch of Blue Shark and Shortfin Mako has doubled since 2000, while the catch of “Raja rays nei” has declined by 65%.
- In the UK, the catch of Spiny Dogfish has declined by 88% since 2000, the catch of “Dogfishes and hounds nei” by 95% and the catch of “Raja rays nei” by around 50%. There has also been a decline of around 99% in the catch of Leafscale Gulper Shark.
- Similarly, in the USA, the catch of “Dogfish sharks nei” declined by 76% since 2000 and the catch of Spiny Dogfish by 60%. There were significant increases in the catch of “Raja rays nei” and “Rays, stingrays, mantas nei”, catch in these categories increasing by 44% and 376% respectively.

DEVELOPMENTS IN MANAGEMENT

International

International initiatives for the conservation and management of sharks occur through:

- the FAO’s IPOA-Sharks;
- resolutions of the UNGA;
- CITES; and
- the CMS.

IPOA-Sharks

The FAO reports on implementation of the IPOA-Sharks, amongst other things, at each meeting of its Committee on Fisheries. In 2009, the FAO reported (FAO, 2009c) that 68 of its members (only one third of the FAO membership) had responded to its questionnaire and that of those:

- about 50% (i.e. around 34) had conducted an assessment as to whether an NPOA was needed, marking a plateau with 2007 figures;
- of those 34, 90% had developed and implemented an NPOA.

Putting aside the question of quality, the development of NPOAs do in themselves provide some indication of the level of commitment of a catching country to management of its shark fisheries. The current status of development of NPOAs by the 17 key shark catchers is described in **Table 4**. Of those, 11 are known to have developed an NPOA-Sharks. Neither of the two top catchers, Indonesia and India, have an NPOA-Sharks. Of the top 20 catching countries in 2007 alone (see **Annex 1**), only half are known to have an NPOA-Sharks in place.

Table 4: Development of NPOA-Sharks by key catching countries/territories

Rank & country/territory	NPOA-Sharks
1. Indonesia	No, drafting began in 2004 but is yet to be finalized
2. India	No, under development as at October 2004, but current status unknown
3. Spain	Yes, European Community (EC) Action Plan on the Conservation and Management of Sharks
4. Taiwan	Yes
5. Mexico	Yes
6. Pakistan	No, under development as at October 2004 but current status unknown
7. Argentina	No, under development as at October 2004 but current status unknown
8. USA	Yes
9. Japan	Yes
10. Malaysia	Yes
11. Thailand	Yes
12. France	Yes, EC Action Plan
13. Sri Lanka	No
14. Brazil	No, drafted, 2006 but current status unknown
15. New Zealand	Yes
16. Portugal	Yes, EC Action Plan
17. UK	Yes, UK Plan released in 2004 and EC Action Plan

Six of the key shark catchers have not completed NPOA-Sharks. Further, the quality of the existing NPOA-Sharks, varies and, in the absence of any reporting mechanism on implementation of the NPOAs, it remains unclear whether, even where an NPOA exists, it is being implemented or what impact the plan has had on conservation and management of sharks. The IPOA-Sharks indicates that NPOAs should be reviewed every five years. Given that some NPOAs have now been in place for five years or longer, it would be reasonable to expect that evaluations of progress and revised Plans would be emerging. To date, only Japan has issued a revised version of its NPOA-Sharks.

International conventions

Some species of shark are now subject to management under a range of international instruments. Ten shark species are listed in the Appendices of CITES and seven species in CMS (see **Table 5**). In addition to these listings, the Parties to CITES have recognized the conservation threat that international trade poses to sharks through adoption of a number of Resolutions and Decisions (*Res. Conf. 9.17* and *Res. Conf. 12.6* and *Decisions 10.48, 10.73, 10.74, 10.93, 10.126, 11.94, 11.151, 13.42, 13.43*). At the fourteenth meeting of the Conference of the Parties to CITES (CoP14), in 2007, a number of decisions on

sharks and stingrays were adopted. At the 24th meeting of the CITES Animals Committee, April 2009, the sharks and stingray working group concluded the following in document *AC24 WG5*:

"The Shark Working Group discussed document *AC24 Doc. 14.1*, submitted by the United States of America, and its commonalities with Annex IV of document *AC24 Inf. 6*, submitted by the FAO. The lists of priority shark species identified in these two documents and in Annex 3 of *CoP14 Doc. 59.1* overlap significantly (Table 1) [*see page 11 of this document*]; FAO and CITES both agree that it is necessary to take action to improve data collection, management, conservation and trade monitoring for these species, although it was noted that other species would likely have been identified in *AC14 Inf.6* if additional FAO Members had attended the workshop. Parties are asked to note the preliminary analysis of requiem and pelagic sharks presented in document *AC24 Doc. 14.1*.

The Shark Working Group recommends continued research to improve understanding of the situation and identify the linkages between international trade in shark fins and meat, and IUU fishing. It is necessary to improve the collection of catch and trade data at the lowest taxonomic level possible (ideally by species). In this context, close cooperation with FAO and RFMOs is encouraged in order to further clarify the nature of IUU fishing. In addition, studies of trade in shark meat, including prices in major fish markets, are also encouraged in order to better identify the shark products that are driving IUU fishing.

The Shark Working Group noted the FAO Guidelines on Responsible Fish Trade[2]. These contain recommendations of direct relevance to the work of FAO and CITES on the topic of sharks. Therefore, the Shark Working Group recommends that the CITES Animals Committee discuss with FAO any benefits that may be gained by discussing elements of Article 11.2.2 of these Guidelines, for example catch and trade certification schemes (paragraphs 8 & 9), with the involvement of representatives from Parties, relevant regional fisheries organizations and the fishing industry, the shark product industry, retailers and the IUCN Shark Specialist Group."

[2] FAO (2009). Responsible Fish Trade. FAO Technical Guidelines for Responsible Fisheries No. 11. FAO, Rome, Italy. ftp://ftp.fao.org/docrep/fao/011/i0590e/i0590e00.pdf

Table 1: Shark species of concern listed in CoP 14 Doc 59.1 Annex 3.

Species listed in CoP14 59.1 and/or AC24 Doc.14.1.	**FAO's list of primary species for monitoring of fisheries and trade**[1]	**Action taken under CITES**
Spiny dogfish shark *Squalus acanthias*	Nominated by Spain, Argentina, Japan	Considered and rejected for listing in Appendix II at CoP14; have entered range State consultation prior to consideration at CoP15
Porbeagle shark *Lamna nasus*	Nominated by Spain	
Freshwater stingrays Family Potamotrygonidae	-	Decision 14.109. New AC recommendations proposed.
Sawfishes Family Pristidae	Nominated by the United States of America	Listed in the CITES Appendices
Gulper sharks genus *Centrophorus*	Nominated by Sri Lanka	
School, tope, or soupfin shark *Galeorhinus galeus*	Nominated by Argentina	Decision 14.114 not yet implemented.
Guitarfishes, shovelnose rays Order Rhinobatiformes	Four species nominated by West African CSRP (*Commission sous-régionale des pêches*) (7 States)	
Requiem and pelagic sharks	Many species nominated	Some reviewed in AC24 Doc. 14.1
Devil rays Family Mobulidae	-	
Leopard sharks *Triakis semifasciata*	-	
Species reviewed in AC24 Doc 14.1		
Hammerhead sharks *Sphyrna* spp	Nominated by eight States & West African CSRP (7 States), China (Hong Kong SAR)	
Dusky shark *Carcharhinus obscurus*	Nominated by the United States of America	
Thresher sharks *Alopias* spp	Nominated by Panama, Sri Lanka, Indonesia	
Shortfin mako *Isurus oxyrinchus*	Nominated by Hong Kong, Spain, the United States of America, Japan	
Silky shark *Carcharhinus falciformis*	Nominated by China (Hong Kong SAR), Sri Lanka, Indonesia	
Oceanic whitetip shark *Carcharhinus longimanus*	Nominated by Panama	
Blue shark *Prionace glauca*	Nominated by China (Hong Kong SAR), Spain, Panama, Ghana, the United States of America, Japan	
Sandbar shark *Carcharhinus plumbeus*	Nominated by China (Hong Kong SAR), the United States of America	
Bull shark *Carcharhinus leucas*	-	
Tiger shark *Galeocerdo cuvier*	Nominated by Ghana	

[1] AC24 Inf. 6. Report of the FAO Technical Workshop on Status, Limitations and Opportunities for Improving the Monitoring of Shark Fisheries and Trade (Advance copy). *FAO Fisheries and Aquaculture Report* No. 897. Appendix IV: Provisional list of primary species of elasmobranchs for the monitoring of fisheries and trade.

The Parties to the CMS have begun work on the development of an instrument for international cooperation on migratory sharks. To date, that work has resulted in agreement to develop a non-binding Memorandum of Understanding (MoU) that will apply to Basking Shark *Cetorhinus maximus*, Great White Shark *Carcharodon carcharias* and Whale Shark *Rhincodon typus* with consideration to be given to including the other four species currently listed in Appendix II (see **Table 5**). It is expected that the MoU will be finalized in 2009.

Table 5: Listings of shark species in international conventions

Instrument	**Species**	
CITES	Basking Shark	Appendix II (2003)
	Whale Shark	Appendix II (2003)
	Great White Shark	Appendix II (2005)
	Narrow Sawfish *Anoxypristis cuspidata*	Appendix I (2007)
	Dwarf Sawfish *Pristis clavata*	Appendix I (2007)
	Wide Sawfish *P. pectinata*	Appendix I (2007)
	Largetooth Sawfish *P. perotteti*	Appendix I (2007)
	Common Sawfish *P. pristis*	Appendix I (2007)
	Green Sawfish *P. zijsron*	Appendix I (2007)
	Freshwater Sawfish *P. microdon*	Appendix 2 (2007)
CMS	Whale Shark	Appendix II (1999)
	Great White Shark	Appendices I and II (2002)
	Basking Shark	Appendices I and II (2005)
	Shortfin Mako	Appendix II (2008)
	Longfin Mako *Isurus paucus*	Appendix II (2008)
	Porbeagle *Lamna nasus*	Appendix II (2008)
	Spiny Dogfish (Northern Hemisphere populations)	Appendix II (2008)

UNGA

In 2006, 2007 and 2008 the UNGA has passed resolutions expressing concern for the status of shark populations and calling for improved conservation and management. Relevant extracts from the 2008 UNGA resolution on sustainable fisheries are included in **Box 1**. As part of that resolution the UNGA has requested that the FAO provide a comprehensive report on the implementation of the IPOA-Sharks to the 64th session of the UNGA in September 2009.

Box 1 UNGA 2008 Resolution on Sustainable Fisheries—Shark

Recognizing further the economic and cultural importance of sharks in many countries, the biological importance of sharks in the marine ecosystem as key predatory species, the vulnerability of certain shark species to overexploitation, the fact that some are threatened with extinction, the need for measures to promote the long-term conservation, management and sustainable use of shark populations and fisheries, and the relevance of the International Plan of Action for the Conservation and Management of Sharks, adopted by the Food and Agriculture Organization of the United Nations in 1999,in providing guidance on the development of such measures,

Reaffirming its support for the initiative of the Food and Agriculture Organization of the United Nations and relevant subregional and regional fisheries management organizations and arrangements on the conservation and management of sharks, while noting with concern that basic data on shark stocks and harvests continue to be lacking, that only a small number of countries have implemented the International Plan of Action for the Conservation and Management of Sharks, and that not all regional fisheries management organizations and arrangements have adopted conservation and management measures for directed shark fisheries,

Reaffirms paragraph 10 of resolution 61/105, and calls upon States, including through regional fisheries management organizations or arrangements, to urgently adopt measures to fully implement the International Plan of Action for the Conservation and Management of Sharks for directed and non-directed shark fisheries, based on the best available scientific information, through, inter alia, limits on catch or fishing effort, by requiring that vessels flying their flag collect and regularly report data on shark catches, including species-specific data, discards and landings, undertaking, including through international cooperation, comprehensive stock assessments of sharks, reducing shark by-catch and by-catch mortality, and, where scientific information is uncertain or inadequate, not increasing fishing effort in directed shark fisheries until measures have been established to ensure the long-term conservation, management and sustainable use of shark stocks and to prevent further declines of vulnerable or threatened shark stocks;

14. *Calls upon* States to take immediate and concerted action to improve the implementation of and compliance with existing regional fisheries management organization or arrangement and national measures that regulate shark fisheries, in particular those measures which prohibit or restrict fisheries conducted solely for the purpose of harvesting shark fins, and, where necessary, to consider taking other measures, as appropriate, such as requiring that all sharks be landed with each fin naturally attached;

15. *Requests* the Food and Agriculture Organization of the United Nations to prepare a report containing a comprehensive analysis of the implementation of the International Plan of Action for the Conservation and Management of Sharks, as well as progress in implementing paragraph 11 of General Assembly resolution 62/177, for presentation to the Committee on Fisheries at its twenty-eighth session, in 2009; (UNGA, 2009).

Regional action

At the regional level, initiatives to address conservation and management of sharks occur through:

- regional conservation instruments;
- regional fisheries bodies; and
- other regional fora.
-

Regional conservation instruments

Shark species are listed in a number of regional instruments, including the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (the Barcelona Convention), the Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention) and the Convention on the Protection of the Marine Environment of the Baltic Sea Area (the Helsinki Convention). Action taken in respect of sharks under each of these conventions is summarized in **Table 6**. It should be noted, however, that the OSPAR Convention has no competence to manage

these species and defers management responsibility to the relevant international body and, that while a number of shark species have been identified as High or Medium Priority threatened species under the Helsinki Convention, no management action to address this has been taken.

Table 6: Shark species identified under regional ronventions

Convention	Species	Action
Barcelona Convention	Great White Shark	Annex II
	*B*asking Shark	Annex II
	Giant Devil-Ray *Mobula mobular*	Annex II
	Shortfin mako,	Annex III
	Porbeagle	Annex III
	Blue shark	Annex III
	White skate *Raja alba*	Annex III
	Angel shark *Squatina squatina*	Annex III
OSPAR Convention	Basking Shark	Each identified as a Threatened and/or declining species
	Common Skate *Dipturus batis*	
	Spotted Ray *Raja montagui*	
Helsinki Convention	Spiny Dogfish	High Priority
	Angelshark	High Priority
	Thintail thresher *Alopias vulpinus*	High Priority
	Basking Shark	High Priority
	Porbeagle	High Priority
	Blackmouth Catshark *Galeus melanostromus*	High Priority
	Small-spotted Catchsark *Scyliorhinus galeus*	High Priority
	Blue Skate *Dipturus batis*	High Priority
	Thorny Skate *Amblyraja radiata*	High Priority
	Thornback Ray *Raja clavata*	High Priority
	Spotted ray *Raja montagui*	High Priority
	Greenland Shark *Somniosus microcephalus*	Medium Priority
	Velvetbelly lantern shark *Etmopterus spinax*	Medium Priority
	Blue Shark	Medium Priority
	Spotted torpedo *Torpedo marmorata*	Medium Priority
	Rabbit Fish *Chimaera monstrosa*	Medium Priority
	Common Stingray *Dasyatis pastinaca*	Medium Priority
	Shagreen Ray *Leucoraja fullonica*	Medium Priority

Source: Garcia Nunes (2008).

Regional fisheries bodies

A summary of the measures adopted for sharks by regional fisheries management organizations (RFMOs) is provided in **Annex 2**. In the main, these measures relate to controls on finning, requirements for the collection and reporting of data on shark catch and encouragement to release live sharks wherever possible. Such measures apply to all shark species, provide no cap on the level of catch of sharks and provide no specific protection to the most vulnerable species. There are only few instances of species- specific shark measures and of measures that attempt to impose a direct constraint on the level of catch of sharks. Those include:

- the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has prohibited the targeting of sharks in CCAMLR waters'

- the Northwest Atlantic Fisheries Organization (NAFO) has imposed quota limits for Thorny Skate;
- the North East Atlantic Fisheries Commission (NEAFC) has introduced limits on deep-sea fishing effort which may reduce the by-catch of deep-sea shark species and has prohibited directed fishing for Basking Shark and Spiny Dogfish;
- the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the General Fisheries Commission for the Mediterranean (GFCM) have agreed to reduce fishing mortality on Shortfin Mako Shark and Porbeagle, although no catch limits have been set; and
- ICCAT requires, to the extent practicable, the release unharmed of Bigeye Thresher Shark *Alopias superciliosus*.

In addition, some RFMOs have sought either stock assessments, or the best available advice of their scientific advisory body ,on the status of specific shark species. For example:

- the Western and Central Pacific Fisheries Commission (WCPFC) has requested advice on the stock status of Blue Shark, Oceanic Whitetip Shark *Carcharhinus longimanus*, Mako sharks and Thresher sharks by 2010; and
- ICCAT has sought a stock assessment of .or thorough review of the available information on, and management advice for, Porbeagle by 2009.

In the main, RFMOs continue to rely on generic controls on finning based on fins:body weight ratios for addressing conservation concerns for sharks. It remains unclear whether such controls are effective in reducing mortality of sharks. Further, such controls have no impact on the mortality of sharks which are discarded because their fins have no or very low market value (see discussion on discarding below). In addition, and as noted above, controls on finning are a blunt instrument that have no capacity to provide differential protection to those shark species most at risk from overfishing. The IOTC Scientific Committee identified a number of issues associated with reliance on the 5% fins:body weight ratio requirement in place in the IOTC that are relevant to all such measures. The issues raised by the IOTC Scientific Committee include:

- the ratio has no clear scientific basis as a conservation measure for sharks;
- it appears to be aimed at slowing down the rate of fishing to deter fishing on sharks by not allowing fins only to be landed and requiring vessels to return to port more often to unload fins and body parts;
- it precludes the collection of data on species-level interactions with fishing fleets which is crucial for accurate stock assessments for sharks;
- the percentage fins:body weight varies widely among species, fin types used in calculation, the type of carcass weight used (whole or dressed) and fin cutting techniques;

- the best way to ensure that sharks are fully utilized is to require that the trunks be landed with fins attached and this would also facilitate the collection of data for stock assessments;
- the fins:body weight ratio measure should be replaced with a requirement that shark fins be landed attached to the body, either naturally or by other means so that they are able to be matched to a carcass (IOTC Scientific Committee, 2008).

Regional fora

The European Community has also taken action in relation to shark fishing. The main measures in place have been described by Garcia Nunes (2008) and are listed below.

- Since 2007, Community vessels are prohibited to fish for, to retain on board, to tranship and to land Basking Shark and Great White Shark in all Community and non-Community waters in response to the listing of these species on the CMS.
- Since 2007, total allowable catches have been set for Leafscale Gulper Shark, Portuguese Dogfish, Kitefin Shark *Dalatias licha*, Birdbeak Dogfish *Daenia calcea*, Great Lantern Shark *Etmopterus princeps*, Smooth Lantern Shark *E. pusillus*, Velvetbelly Lantern Shark, Gulper Shark *Galeorhinus galeus*, Porbeagle, Spiny Dogfish and for skates and rays of the family *Rajidae*.
- By-catch of Spiny Dogfish and skates and rays of the family *Rajidae* cannot comprise more than 25% by live weight of the catch retained on board.
- Specific mesh sizes are also established for direct fishing of skates of the family Rajidae.
- Community vessels are subject to controls on shark finning.
- The European Community launched its Community Plan of Action for the Conservation and Management of Sharks in February 2009.

The Pacific Islands Forum Fisheries Agency, together with the South Pacific Environment Program, the Secretariat of the Pacific Community and the WCPFC have agreed to develop a Pacific Islands Regional Plan of Action on Sharks. The Regional Plan, to be completed in 2009, will provide guidance to Pacific Island countries on how to implement shark conservation and management measures developed in the WCPFC in order to promote consistency of approaches across the region and will provide a model NPOA-Sharks including a range of monitoring, assessment and management arrangements.

IMPACTS OF DISCARDING ON DATA AND MANAGEMENT

Most discussion about shark catch data and the focus of most management measures for shark taken as by-catch, relates to retained shark catch. The FAO Fishstat *Capture Production Database* reports retained catches of fish species and does not include information on discards. Yet a study by FAO (Kelleher, 2005) has estimated that more than 200 000 t per year of sharks are discarded. Other

estimates support the proposition that discard rates of sharks, and some species of sharks in particular, are high. Some examples are cited below.

- Xiaojie *et al*. (2006) in the tropical longline fisheries for Bigeye Tuna *Thunnus obesus* in the Eastern Pacific Ocean found that the elasmobranch catch of the fisheries comprised 11 species and that:
    - both body and shark fins of Shortfin Mako, Scalloped Hammerhead *Sphyrna lewini*, Oceanic Whitetip Shark and Silky Shark are retained. The fins of Blue Shark are retained and bodies are discarded. Both body and shark fins of Longfin Mako, Crocodile Shark *Pseudocarcharias kamoharai*, Bigeye Thresher, Velvet Dogfish *Zameus squamulosus*, pelagic rays and mantas are discarded;
    - catch of even the economically valuable sharks such as Shortfin Mako, Scalloped Hammerhead, Oceanic Whitetip Shark and Silky Shark are recorded in the logbook as 'other' rather than by species;
    - total catch of sharks and rays (retained and discarded) in the observed catch amounted to 24 941 kg, of which 85% was discarded. Blue Shark comprised nearly 90% of the weight of discards; and
    - the ratio of Blue Shark weight to Bigeye Tuna weight was 0.52:1.0.
- In the Western Indian Ocean recent research has found that 85% of immature Silky Sharks taken as by-catch by the French tuna purse seine fishery cean are discarded (Amandé *et al*., 2008).
- Observer data in the Hawaii-based longline swordfish and tuna fisheries in 2006 showed that over 90% of sharks were alive when hauled on to the vessel and that more than 90% of those sharks were discarded alive. In contrast, observer data from the Fiji pelagic longline fishery shows that while 80% of sharks were alive when hauled on to the vessel only 20% of these were discarded alive. Only 15% of Blue Sharks, 11% of Oceanic Whitetip Sharks and 6% of Silky Sharks were discarded alive (Gilman *et al*., 2007).
- Data for the Australian Western Tuna and Billfish fishery show that significant number of sharks including Blue Shark, Crocodile shark, Oceanic Whitetip shark, Hammerhead sharks, Shortfin Mako Shark, Thresher Shark and Tiger Shark *Galeocerdio cuvier* were taken as by-catch in the fishery. In 2003, 92% of Blue Sharks, 100% of Crocodile Sharks, 89% of Oceanic Whitetip Sharks, 91% of Hammerhead Sharks, 93% of Shortfin Mako, 92% of Thresher Shark and 96% of Tiger Sharks were discarded (Lynch, 2004). In some cases, for example Crocodile Sharks, it is known that the species is discarded because its fins have no value and post release survival is thought to be low (Hender *et al.*, 2007).

Only in rare instances are shark discards recorded in logbooks and observer estimates of the extent and species composition of shark discards, remain limited. This means that the true impact of fishing on sharks is generally unknown. Lack of information on shark discards seriously compromises attempts to undertake stock assessments or to provide scientific advice on the impacts of fishing on shark stocks. It also has implications for the effectiveness of the primary management tool in place for sharks in fisheries where sharks are taken as by-catch i.e. finning controls.

Sharks are discarded, whole or in part, as a result of factors including:

- lack of markets for some shark species;
- the relatively low value of the meat of many shark species compared to that of target species;
- the relative value of shark fins and meat, resulting in the discard of shark trunks and retention of only fins;
- the application of catch limits in target shark fisheries which may result in highgrading (retention of higher valued specimens and discarding of lower value (e.g. poor quality, not marketable size) specimens and discarding of catch taken after catch quotas have been filled;
- the introduction of trip limits on the retention of shark by-catch whereby sharks are discarded when the limits are met and/or in order to highgrade within that limit; and
- the unmarketable nature of some large specimens because of concerns over mercury levels.

The studies cited above show that there is a high rate of discarded shark species. Mortalities associated with those discards are not reflected adequately, if at all, in assessments of the impact of fisheries on sharks. The examples also show that many discards can be returned to the sea alive, so discards do not necessarily equate to mortality. The level of post-release mortality will depend on factors including the fishing methods, handling and release procedures and the inherent biological and morphological characteristics of the shark. Observer data from the Australian Western Tuna and Billfish Fishery demonstrate the differences in condition across shark species upon retrieval of pelagic longlines:

- 9% of Blue sharks, 10% of Oceanic Whitetip Shark, 13% of Silky Shark, 20% of Crocodile Shark, 25% of Bigeye Thresher Shark, 43% of Thresher Shark,59% of Hammerhead shark and 80% of Pelagic Thresher Sharks were dead; and
- around 33% of Crocodile Sharks and Blue Sharks and 50% of Shortfin Mako Sharks retrieved alive were assessed as either ‘just alive’ or ‘alive and sluggish’, while only 9% of Dusky Sharks fell into these categories (Hender *et al.,* 2007).

These data have implications for the effectiveness of measures used to reduce fishing mortality on sharks. They are of particular significance for assessing the effectiveness of finning controls. The rationale for such controls is that requiring fishers to retain the carcasses of sharks, when fins are

retained, will act as a disincentive to target sharks and an incentive to return them to the sea without further harm. However, if a shark does not have valuable fins or meat, it will be returned to the sea regardless of the controls on finning. For such species finning bans provide no added protection. Further, since they are completely discarded, they are not included in most official national statistics, despite that fact that some mortalities have occurred during capture and others are likely to occur post-release. For species that are returned to the sea, despite the fact that they are of value for fins (and/or meat) the protection provided by the finning controls will depend on its post-release survival which will, in turn, be affected by the species concerned and how resilient it is to the method of capture and the methods used to retrieve and release the shark.

There is a clear need for more sophisticated, species-specific measures to mitigate shark by-catch and for greater emphasis to be placed on gaining a better understanding of the level and condition of discards of sharks, on a species basis.

Measures such as reporting the quantity, species and life status of all shark discards and/or prohibiting discards of sharks are possible responses to this issue. However, the effectiveness of such regulations will depend on the level of compliance and such measures would be difficult to enforce. In addition, the reporting of all shark discards would be quite onerous for fishers in terms of both the capacity to identify shark species correctly and the amount of work required to record the information. The quality of the information collected may therefore be compromised.

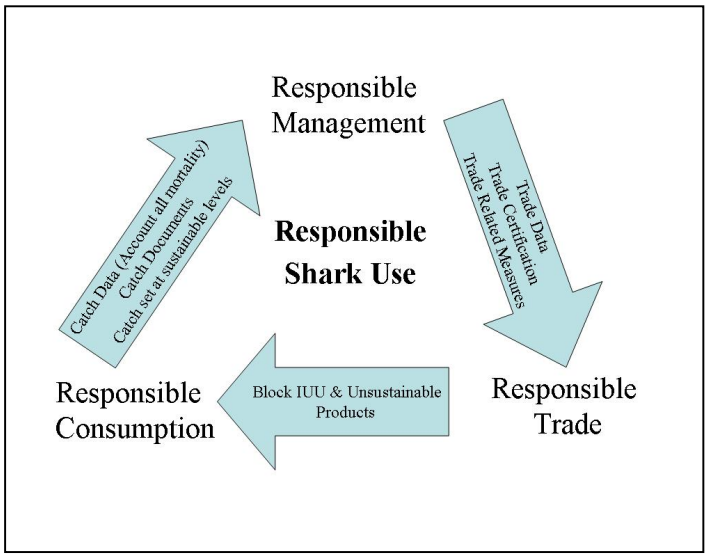
Other options include the collection of data by observers or the conduct of fishery independent surveys. Observer coverage of fishing operations in which sharks are taken as by-catch is critical to the estimation of the composition and level of by-catch of sharks, and the estimation of likely mortality incurred as a result of that by-catch. While it is unlikely to be feasible to maintain high levels of observer coverage across such fleets the development of programmes to provide baseline observer data on the by-catch, discards and condition of discards in those fisheries would be a significant step forward in gaining a better understanding of the shark species interacting with fishing vessels and the impact of those interactions on shark populations. Such programmes could then be repeated at regular intervals to determine the impact of any shark by-catch mitigation measures, and any other changes in the fishing operations. An alternative, but more costly, approach is to undertake fishery-independent surveys to gather similar data.

In the short term, and where there is limited capacity to implement programmes to better define the nature and extent of discarding of sharks, the ongoing uncertainty in the level of mortality occurring dictates the need for more precautionary approaches to be adopted to management of sharks. In addition, management must recognize that that finning bans fail to provide any protection for those species of sharks that are not valued for their fins. Complementary management measures must be introduced.

CONCLUSIONS

Responsible use of shark products requires responsible management, trade and consumption. Each of these elements requires improvements in governance and monitoring to provide confidence that traded shark products are from sustainable sources. The links between these elements and the nature of the required initiatives are described in the flow diagram in **Figure 1**.

Figure 1: **Elements of responsible shark use**



There are some characteristics of the available global data for sharks that seriously compromise responsible shark management and trade, as noted below:

- ***Shark catch data are underreported.*** It is known that the data reported to FAO represent only some proportion of the catch. Sharks are known to be taken in fisheries in a number of countries that do not report shark catch to FAO. For example, a review of information provided to the WCPFC identified shark catch in the Federates States of Micronesia, Fiji and Papua New Guinea, however none of these countries report shark catch to the FAO (Anon, 2008). Further, there are significant discrepancies between the exports of sharks by some countries and their reported catch of shark which suggest that catch may be under-reported (see Lack and Sant, 2006). National statistics reported to FAO may themselves be subject to under-reporting of shark catch, depending on the nature and level of verification of the catch data

- ***There is a lack of species-species specific catch data.*** In addition, misidentification of shark species introduces uncertainty into the species-specific data that are available.
- ***There is a limited capacity to use trade analysis to verify levels of shark catch***, given that there are very few specific trade codes in use for shark products.
- ***The capture production data reported by FAO relate only to retained shark catch*** and in no way reflect shark mortality incurred by fishing. This is particularly important for sharks since the discard rate for shark products is high relative to many other species. In addition to discards, other forms of so-called 'cryptic' mortality occur and are inherently difficult to estimate.

These issues were discussed in the FAO-sponsored technical workshop considering ways to improve monitoring of shark fisheries and trade (FAO, 2009d). The first three issues reflect deficiencies in data-collection in shark-catching countries and a failure to meet international responsibilities to provide accurate and comprehensive catch and trade data to the FAO or to RFMOs of which they are members. The fourth issue, discarding of shark, has significant implications for both the utility of shark catch data collected and the effectiveness of common fisheries management measures aimed at minimizing shark mortality.

Responsible shark use will require these issues to be addressed by countries, particularly by the top catching countries. The IPOA-Sharks prescribes a wide range of action that in total is beyond the capabilities of some countries to implement. Given this, a more pragmatic approach may be to prioritize initial research and action to a few key species or areas of data collection. This will provide a starting point from which the goal of responsible shark use can be achieved. Countries will need to continue to build on this platform if this globally recognized conservation issue is to be addressed.

REFERENCES

Amandé M.J., Chassot, E.,Chavance, P., Pianet, R. (2008). *Silky shark (*Carcharhinus falciformis*) bycatch in the French tuna purse-seine fishery of the Indian Ocean. (IOTC-2008-WPEB-16).*

Anon. (2007). *Sharks and the 14th meeting of the Conference of the Parties to CITES, The Hague, Netherlands, 03–15 June 2007*. Available at: http://www.traffic.org/cop14/.

Anon. (2008). *Annual Report – Part 1 Information on Fisheries, Research, and Statistics,* WCPFC-SC4-Ar Part 1/Wp-23. Scientific Committee Fourth Regular Session 11-22 August 2008 Port Moresby, Papua New Guinea. Available at: http://www.wcpfc.int/ .

CITES Animals Committee (2009). Report of the Working Group on Sharks and Stingrays (Working Group 5) 24th Meeting of the Animals Committee, Geneva, (Switzerland), 20-24 April 2009. Available at: http://www.cites.org/common/com/AC/24/wg/E-AC24-WG05.pdf

FAO (2009a). Report of the Technical Workshop on the Status, Limitations and Opportunities for Improving the Monitoring of Shark Fisheries and Trade, Rome, 3-6 November 2008. *FAO Fisheries and Aquaculture Report No. 897* FIMF/R897. Available at: http://www.cites.org/eng/com/AC/24/index.shtml.

FAO (2009b). *FAO Fishstat Capture Production Database 1950-2007*. Available at: http://www.fao.org/fishery/statistics/global-capture-production/en

FAO (2009c). *Progress in the implementation of the Code of Conduct for Responsible Fisheries, related international Plans of Action and Strategy***.** Meeting document COFI/2009/2.

FAO (2009d). Responsible Fish Trade. *FAO Technical Guidelines for Responsible Fisheries. No. 11*. FAO, Rome.

Garcia Nunes, N. E. (2008). *Sharks. Conservation, Fishing and International Trade*. Gobierno de Espana. Ministerio de medio ambiente y medio rural y marino.

Gilman, E., Clarke, S., Brothers, N., Alfaro-Shiguetto, J., Mandelman, J., Mangel, J., Petersen, S., Piovano, S., Thomson, N., Dalzell, P., Donoso, M., Goren, M. and Werner, T. (2007). *Shark Depredation and Unwanted Bycatch in Pelagic Longline Fisheries. Industry Practices and Attitudes and Shark Avoidance Strategies*. Western Pacific Regional Fishery Management Council, Honolulu, USA.

Hender, J., Ward, P., Knight, E and Darbyshire, R. (2007). *Pilot Scientific Monitoring Program for the Western Tuna and Billfish Fishery Final Report (2003–06), BRS Canberra*

IOTC Scientific Committee (2008). *Report of the Eleventh Session of the Scientific Committee of the IOTC, Victoria, Seychelles, 1-5 December 2008.* Available at: http://www.iotc.org/files/proceedings/2008/s/IOTC-2008-S12-R[E].pdf

IUCN (2008). *2008 IUCN Red List of Threatened Species*. Available at www.iucnredlist.org.

Kelleher, K. (2005). Discards in the World's Marine Fisheries. An update. *FAO Fisheries Technical Paper. No. 470*. Rome, FAO.

Lack, M and Sant, G (2006). *Trends in World Shark Catch, Production and Trade, 1990-2003*. Australian Government Department of the Environment and Heritage and TRAFFIC Oceania. Available at: http://www.traffic.org/fish/.

Lack, M. and Sant, G. (2008). *Illegal, Unreported and Unregulated Shark Catch: A review of current knowledge and action.* Department of the Environment, Water, Heritage and the Arts and TRAFFIC, Canberra. Available at: http://www.traffic.org/fish/.

Lynch, A. (2004). *Southern and WesternTuna and Billfish Fishery Data Summary 2003.* Available at: http://www.afma.gov.au/information/publications/fishery/data_summ/docs/swtbf_2003.pdf

Polidaro, B.A., Livingstone, S.R., Carpenter, K.e., Hutchinson, B., Mast, R.B., Pilcher, N., Sadovy de Mitcheson, Y. and Valenti, S. (2008). *Status of the World's Marine Species*. Available at: http://iucn.org/about/work/programmes/species/red_list/review/

UNGA (2009). *A/RES/63/112 - Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments*. Available at: http://www.un.org/Depts/los/general_assembly/general_assembly_resolutions.htm

Xiaojie-DAI, Liu-xiong XU and Li-ming Sonng (2006). *Catch Estimation of Pelagic Sharks by Chinese Longline Observer in the Eastern Pacific Ocean* . Document SAR-7-09a IATTC Tropical Tuna Working Group to Review Stock Assessment, 7th meeting, La Jolla California (USA), 15-19 May 2006. Available at: http://www.iattc.org/PDFFiles2/SAR-7-09a-Shark-bycatch-CHN-LL-fishery.pdf

ACRONYMS

CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
FAO	Food and Agriculture Organization of the United Nations
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
CoP	Meeting of the Conference of the Parties (to CITES)
GFCM	General Fisheries Commission for the Mediterranean
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
IPOA-Sharks	International Plan of Action for the Conservation and Management of Sharks
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	Northeast Atlantic Fisheries Commission
NPOA - Sharks	National Plan of Action for the Conservation and Management of Sharks
RFMO	Regional Fisheries Management Organization
UNGA	United Nations General Assembly
WCPFC	Western and Central Pacific Fisheries Commission

Annex 1

Top twenty catching countries/territories 2007 (t)

Rank	Catcher	2007
1	Indonesia	116 820
2	India	84 093
3	Taiwan	48 707
4	Spain	46 187
5	Argentina	44 112
6	Mexico	34 638
7	USA	34 287
8	Malaysia	21 764
9	France	19 622
10	Portugal	18 464
11	New Zealand	17 409
12	Japan	17 257
13	Brazil	17 233
14	Thailand	16 925
15	Pakistan	16 284
16	Nigeria	15 292
17	Iran	13 187
18	Yemen	12 387
19	Korea, Republic of	11 374
20	Venezuela	11 294
	Total	**617 336**

Annex 2

Shark conservation and management measures of RFMOs

RFMO	Measures in Place
IATTC	Fishers on purse-seine vessels to promptly release unharmed, to the extent practicable, all sharks and rays (and other non-target species) IATTC to: • Develop techniques and/or equipment to facilitate the release of sharks and rays from the deck or from the net • Seek the necessary funding for experiments to determine the survival rates of released sharks and rays • Define areas and periods in which these species are most likely to be caught. Parties/Co-operating non-Parties/co-operating fishing entities/regional economic integration organizations (CPCs) should implement a National Plan of Action in accordance with the IPOA-Sharks In relation to sharks caught in association with fisheries managed by the IATTC: • The IATTC will provide preliminary advice on stock status of key shark species and propose a research plan to comprehensively assesses those stocks in 2006 • All parts of any retained sharks, except head guts and skin, must be retained to the first point of landing • Vessels may not have onboard fins that total more than 5% of the weight of the sharks onboard at the first point of landing • CPCs to ensure compliance with the measure through certification, monitoring by an observer or other appropriate measures • retention, transhipment, landing or trading of fins harvested in contravention of the measure is prohibited • CPCs to encourage the release of live shark, especially juveniles, taken as by-catch and are not used for food and/or subsistence • CPCs encouraged to research selective gears and identify nursery areas. • CPCs to report annually data for catches, effort by gear type, landing and trade of sharks by species, where possible • CPCs shall provide an annual comprehensive report on the implementation of this resolution
ICCAT	• CPCs shall report data for all catches of sharks (including estimates of dead discards and size frequencies) • All parts of the shark, except head guts and skin, must be retained to the first point of landing

RFMO	Measures in Place
	• Vessels may not have onboard fins that total more than 5% of the weight of the sharks onboard at the first point of landing • CPCs to ensure compliance with the measure through certification, monitoring by an observer or other appropriate measures • retention, transhipment or landing of fins harvested in contravention of the measure is prohibited • CPCs to encourage the release of live shark, especially juveniles, taken as by-catch and are not used for food and/or subsistence • CPCs encouraged to research selective gears and identify nursery areas. • The commission shall consider appropriate assistance to developing CPCs for the collection of data on shark catches • Until sustainable levels of harvest can be determine through peer reviewed stock assessment, CPCs shall take measures to reduce fishing mortality in fisheries targeting Porbeagle *Lamna nasus* and North Atlantic shortfin Mako sharks *Isurus oxyrinchus* • CPCs to promptly release unharmed, to the extent practicable, Bigeye Thresher Sharks *Alopias superciliosus* caught in association with fisheries managed by ICCAT which are alive, when brought along side for taking on board the vessel and report incidental catches and live releases • SCRS to conduct a stock assessment or thorough review of available information and recommend management advice for Porbeagle by 2009
IOTC	• Contracting Parties/Cooperating non-Contracting Parties (CPCs) shall report annually data for catches of sharks • In 2006 the Scientific Committee will provide preliminary advice on the stock status of key shark species and propose a research plan and timeline for a comprehensive assessment of these stocks. • In relation to sharks caught in association with fisheries managed by the IOTC: - All parts of the shark, except head guts and skin, must be retained to the first point of landing - Vessels may not have onboard fins that total more than 5% of the weight of the sharks onboard at the first point of landing - CPCs to ensure compliance with the measure through certification, monitoring by an observer or other appropriate measures - retention, transhipment or landing of fins harvested in contravention of the measure is prohibited - CPCs to encourage the release of live shark, especially juveniles, taken as by-catch and are not used for

RFMO	Measures in Place
	food and/or subsistence - CPCs encouraged to research selective gears and identify nursery areas. - Commission shall consider appropriate assistance to developing CPCs for the collection of data on their catches - Applies without prejudice to many artisanal fisheries which traditionally do not discards carcasses
NAFO	• Contracting parties shall report data for all catches of sharks • All parts of the shark, except head, guts and skin, must be retained to the first point of landing • Vessels may not have onboard fins that total more than 5% of the weight of the sharks onboard at the first point of landing • CPCs to ensure compliance with the measure through certification, monitoring by an observer or other appropriate measures • retention, transhipment or landing of fins harvested in contravention of the measure is prohibited • CPCs to encourage the release of live shark, especially juveniles, taken as by-catch and are not used for food and/or subsistence • CPCs encouraged to research selective gears and identify nursery areas. • Catch quota established for Thorny Skate *Amblyraja radiata* in one fishing Division
GFCM	• Contracting parties shall report data for all catches of sharks • All parts of the shark, except head, guts and skin, must be retained to the first point of landing • Vessels may not have onboard fins that total more than 5% of the weight of the sharks onboard at the first point of landing • CPCs to ensure compliance with the measure through certification, monitoring by an observer or other appropriate measures • retention, transhipment or landing of fins harvested in contravention of the measure is prohibited • CPCs to encourage the release of live shark, especially juveniles, taken as by-catch and are not used for food and/or subsistence • CPCs encouraged to research selective gears and identify nursery areas.' • CPCs to reduce mortality of North Atlantic Shortfin Mako Shark *Isurus oxyrinchus*

RFMO	Measures in Place
SEAFO	• Shark finning banned in fisheries for species covered by the SEAFO convention - all parts of the shark, except head guts and skin, must be retained to the first point of landing - vessels may not have onboard fins that total more than 5% of the weight of the sharks onboard at the first point of landing - retention, transhipment or landing of fins harvested in contravention of the measure is prohibited - Contracting parties to ensure compliance with the measure through certification, monitoring by an observer or other appropriate measures • contracting parties to encourage the release of live shark, especially juveniles, taken as by-catch • contracting parties to report annually data for shark catch • contracting parties encouraged to research selective gears (eg avoiding use of wire traces) and identify nursery areas. • the Commission shall consider appropriate assistance to Developing States, Parties to the convention, for the collection of data on their shark catches
CCAMLR	• Directed fishing on shark species in the Convention Area, for purposes other than scientific research is prohibited. • The Prohibition will apply until the Scientific Committee has investigated and reported on the potential impacts of this fishing activity and the Commission has agreed on the basis of that advice that such fishing may occur. • Any by-catch of shark, especially juveniles and gravid females, taken accidentally in other fisheries, shall, as far as possible, be released alive
NEAFC	• Take of Basking Shark prohibited • Directed fishing for Spiny Dogfish *Squalus acanthias* prohibited • Shark finning prohibited • Effort of Contracting Parties in deep-sea fisheries shall not exceed 65% of the highest level put into deep-sea fishing in previous years for the relevant species.
CCSBT	• Members and Cooperating Non-Members will, to the extent possible, implement the IPOA-Sharks • Members and Cooperating Non-Members will comply with all current binding and recommendatory measures aimed at the protection of sharks, from fishing, which are adopted from time to time by the IOTC and the WCPFC, when fishing in its Convention Area irrespective of whether the Member or Cooperating Non-Member concerned is a member of the relevant

RFMO	Measures in Place
	Commission or otherwise co-operates with it. • Members and Cooperating Non-Members will collect and report data on ecologically related species to the Extended Commission and the Ecologically Related Species Working Group. • The Extended Commission and/or its subsidiary bodies as appropriate will undertake an assessment of the risks to ecologically related species posed by fishing for southern bluefin tuna. The Extended Commission will consider how these risks are mitigated by the adoption of measures described at section 2, and will consider whether any additional measures to mitigate risk are required.
WCPFC	• Commission Members, Cooperating non-Members, and participating Territories (CCMs) shall implement, as appropriate, (IPOA Sharks) and report on its implementation • National measures for sharks should include measures to minimize waste and discards from shark catches and encourage the live release of incidental catches of sharks. • Each CCM shall include key shark species (Blue Shark, Oceanic Whitetip shark, mako sharks and thresher sharks) in their annual reporting to the Commission of annual catch and fishing effort statistics, including retained and discarded catches • CCMs shall as appropriate, support research and development of strategies for the avoidance of unwanted shark captures (e.g. chemical, magnetic and rare earth metal shark deterrents). • CCMs to require that their fishers fully utilize any retained catches of sharks. Full utilization is defined as retention by the fishing vessel of all parts of the shark excepting head, guts, and skins, to the point of first landing or transshipment. • CCMs to require their vessels to have on board fins that total no more than 5% of the weight of sharks on board up to the first point of landing. CCMs that currently do not require fins and carcasses to be offloaded together at the point of first landing shall take the necessary measures to ensure compliance with the 5% ratio through certification, monitoring by an observer, or other appropriate measures. CCMs may alternatively require that their vessels land sharks with fins attached to the carcass or that fins not be landed without the corresponding carcass. • As finer resolution data become available, the specification of the ratio of fin weight to shark weight described in paragraph 7 shall be periodically reviewed by the Scientific Committee • In fisheries for tunas and tuna-like species that are not directed at sharks, CCMs shall take measures to encourage the release of live sharks that are caught incidentally and are not used for food or other purposes. • In 2010, the Scientific Committee, and if possible, in conjunction with the IATTC, provide preliminary advice on the stock status of key shark species and propose a research plan for the assessment of the status of these stocks. • This measure shall apply to sharks caught in association with fisheries managed under the WCPF convention, and to sharks listed in Annex I of UNCLOS.

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).

For further information contact:

Mr Glenn Sant
Global Marine Programme Leader
TRAFFIC
P.O. BOX U115
University of Wollongong
NSW 2522, Australia
Telephone: (61) 2 4221 3221
Fax: (61) 2 4221 3346
Email: glenn.sant@traffic.org

TRAFFIC
the wildlife trade monitoring network
is a joint programme of
WWF
IUCN
The Rufford Maurice Laing Foundation