ITALY

F. Serena, R.T. Baino, C. Mancusi, M. Barone, M. Ria, A.J. Abella, A. Volani
ARPAT – Environmental Protection Agency – Tuscany Region

1. BACKGROUND INFORMATION ABOUT THE SHARK FISHERIES

Main types of shark fisheries

In the Italian fisheries, elasmobranchs catches represent less than the 2 percent of total yield (Shotton, 1999). Smoothhounds and skates (Rajidae) represent about 50 percent (4 463 t/yr) and 38 percent (3 340 t/yr) respectively of the total elasmobranch landings. Most smoothhounds proceed from the Adriatic Sea, where catches have increased since 1978, with a peak in 1985.

In the Mediterranean, and particularly in Italy, almost no elasmobranchs are subject to directed fisheries, but elasmobranchs constitute part of the bycatch in most local artisanal fisheries.

The Italian catches of elasmobranchs primarily derive from two different fisheries: the pelagic artisanal fishery with longlines and gillnets, where smoothhounds are the most common group, and the demersal trawl fishery, where rays and catsharks constitute the main groups among elasmobranchs. In both cases elasmobranchs represent only a bycatch, being the longline fishery directed to swordfish or tunas and the trawl fishery to various assemblages of finfish and cephalopods.

In the northern Adriatic Sea, during spring and winter, gillnet fisheries catch smoothhounds (*Mustelus mustelus* and *M. punctulatus*), spurdog (*Squalus acanthias*), greater-spotted catshark (*Scyliorhinus stellaris*), eagle ray (*Myliobatis aquila*) and tope shark (*Galeorhinus galeus*) (Costantini *et al*., 2000). Starry ray (*Raja asterias*) is commonly caught in trawl fisheries, especially along the Tyrrhenian coasts (Abella *et al.*, 2008). The capture of this species occurs mainly with a modified beam-trawl that target flatfish, i.e. *Solea* spp.

Bottom trawl fisheries operating on the continental shelf and slope along the western and south coast of Italy capture various elasmobranch species such as th blackmouth catshark (*Galeus melastomus*), lesserspotted catshark (*Scyliorhinus. canicula*), velvet belly (*Etmopterus spinax*) and various skates, mostly *Raja clavata* (Relini *et al*. 1999).

Even though they represent a marginal yield compared to fisheries described above, trammel nets set near the bottom may also catch individuals of large sized sharks (Serena and Vacchi, 1997). In the Adriatic Sea, the bycatch of trammel nets includes several demersal species including spiny dogfish (*Squalus acanthias*), smoothhounds (*Mustelus* spp.), skates (*Raja* spp.), electric rays (*Torpedo* spp.), catsharks (*Scyliorhinus* spp.), topes (*Galeorhinus galeus*) as well as occasionally thresher shark (*Alopias vulpinus*) and juvenile sandbar shark (*Carcharhinus plumbeus*).

Many shark species are taken as the bycatch in the Italian deep-water fisheries. The most frequently caught species are the blackmouth catshark (*Galeus melastomus*), smallspotted catshark (*Scyliorhinus canicula*), gulper shark (*Centrophorus granulosus*), velvet belly (*Etmopterus spinax*) and most rarely Portuguese dogfish (*Centroscymnus coelolepis*), kitefin shark (*Dalatias licha*), and longnose spurdog (*Squalus blainvillei*). Blackmouth catshark and smallspotted catshark are by far the most abundant species and have a relatively greater commercial value; other species may often be discarded.

Italian deep-water trawl fisheries, targeting red shrimps, Norway lobster and Mediterranean hake also land blackmouth catshark. The longnose skate (*Dipturus oxyrhinchus*) was formerly a relatively common species in the north Tyrrhenian Sea and in other Italian areas. There is a relatively high abundance of thornback ray (*Raja clavata*) in some deep-water grounds (Serena and Abella, 1999; Abella *et al.*, 2008). Bottom-set longlines targeting Mediterranean hake also take as bycatch the six-gill shark, especially in the Ligurian Sea (Aldebert, 1997) and along the southern Italian coasts, as well as blackmouth catshark and gulper shark.

There are no Italian pelagic fisheries targeting migratory oceanic sharks but these species constitute a component of the bycatch in tuna and swordfish fisheries operating in coastal and offshore waters using longlines, driftnets and occasionally purse seines. No finning activity is reported for the Italian waters.

The fixed tuna traps represent the fishing activities that historically had a major impact on cartilaginous fishes, catching large pelagic sharks and other demersal elasmobranchs. These structures were distributed throughout the Italian coast along the most important tuna migration routes towards the rich areas of the Ligurian-Provencal basin. Today the number of these gears is greatly reduced because of reduction of yields and is confined to few cases in the major Italian islands (Cushing, 1988). The main species of elasmobranch fishes traditionally caught as bycatch in these traps were large specimens of common thresher (*Alopias vulpinus*), basking shark (*Cetorhinus maximus*), blue shark (*Prionace glauca*), devil ray (*Mobula mobular*) and sometimes the great white shark (*Carcharodon carcharias*) (Boero and Carli, 1979; Vacchi *et al.*, 2002). Nowadays these catches are irrelevant for any consideration regarding management or conservation purposes.

Surface longline fisheries that target tuna and swordfish also catch blue shark, pelagic or violet stingray (*Pteryplatotrygon violacea*) and most rarely common thresher (*Alopias vulpinus*), shortfin mako (*Isurus oxyrinchus*), porbeagle (*Lamna nasus*), smooth hammerhead (*Sphyrna zygaena*), sixgill (*Hexanchus griseus*), requiem sharks (*Carcharhinus* spp.), devil ray etc. (De Metrio *et al*., 1999; Orsi-Relini *et al.*, 1999).

A small local artisanal fishery targeting blue shark utilises the so called “stese” (short lines with hooks placed near the surface). This fishery operates mainly in the spring along the Calabria and Apulia southern regions of Italy. Large elasmobranchs are often caught incidentally as bycatch in artisanal fisheries, especially in longline fisheries (Serena and Vacchi, 1997).

Modest catches of blue shark have been landed as bycatch of the surface longline fisheries for swordfish and albacore with mean weight ranging from 3 to 25 kg (De Metrio *et al.*, 1984). A large number of elasmobranch were also caught by large driftnet fisheries, which were once used widely in the Italian waters (De Metrio *et al.*, 1999). The main species caught were blue shark, common thresher, shortfin mako, porbeagle, requiem sharks (*Carcharinus* spp.), basking shark, hammerheads (*Sphyrna* spp.), devil ray and pelagic stingray With the moratorium on drift nets in the Mediterranean, started in January 2002, it is expected that a reduction of the fishing mortality due to this gear will occur, even though there is no direct data available to evaluate this trend.

In the northern Adriatic Sea, gillnets (often set for demersal species) also have a bycatch composed by several pelagic species, with blue shark and common thresher caught mainly during the summer (Costantini *et al.*, 2000). Also basking sharks are incidentally caught with trammel and gillnets, with young individuals caught mainly in shallow waters during spring, because sub-adults and adults are also present in the area. Basking sharks also occur off the coasts of Tuscany and Liguria in spring (Mancusi *et al.*, 2005).

Until now, there have been no detailed statistical data on shark bycatch in Mediterranean pelagic fisheries. In spite of this limitation, in some cases, we have some examples of elasmobranchs, such as pregnant devil ray caught during purse seine activities targeting anchovy (Notarbartolo di Sciara and Serena, 1998); other specimens caught as bycatch in the trammel net and longline fisheries and pelagic stingrays caught as bycatch in the swordfish fishery in the Ligurian Sea (Orsi Relini *et al.*, 2002).

The relative abundance of rays are now fairly well known around Italy due to 20 years series of trawl surveys (Grund and Medits projects, Relini, 1998; Bertrand *et al*., 1997) carried out along the whole continental shelf up to 800 m depth. From the map in Figure 1, reporting the standing stock biomass index of rays from trawl surveys, is quite clear that the Italian rays (around 50 percent of which is represented by *Raja clavata*) are concentrated in Sardinian waters, northern Tyrrhenian and Sicily Straits.

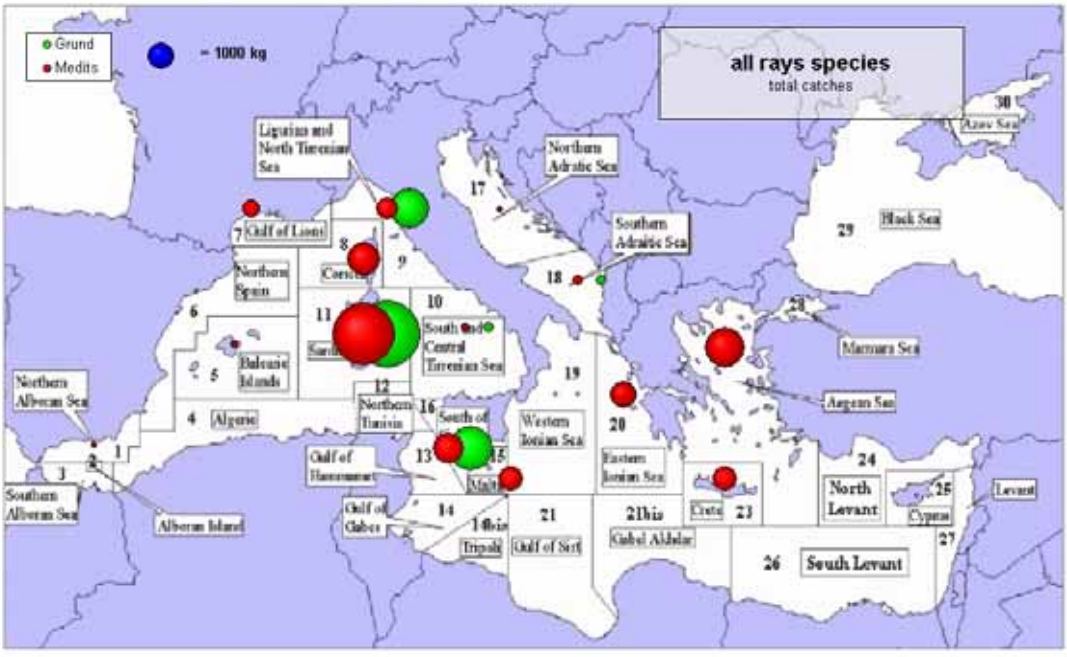

Figure 1: Relative abundance of rays in the Mediterranean Sea derived from trawl surveys

Despite the lack of precise records on elasmobranch bycatch in the Mediterranean pelagic fisheries, a study carried out in the frame of a project financed by the EC (N° 97/50 DG XIV/C1) during 1998–1999, provides data on the bycatch of sharks and discards from the Italian fleets fishing for swordfish and tunas in the grounds shown in Figure 2. According to the assessment of fishing effort related to shark catches by longline fisheries in 1999, effort was mainly located in the Adriatic Sea (2.1 millions hooks) and in the Ionian Sea (1.2 millions hooks), while the efforts in the Sicily Straits (0.05 millions hooks) and in the Tyrrhenian Sea (0.02 millions hooks) were insignificant. Shark species include *Prionace glauca*, *Isurus oxyrinchus*, *Alopias vulpinus* and *Galeorhinus galeus*.

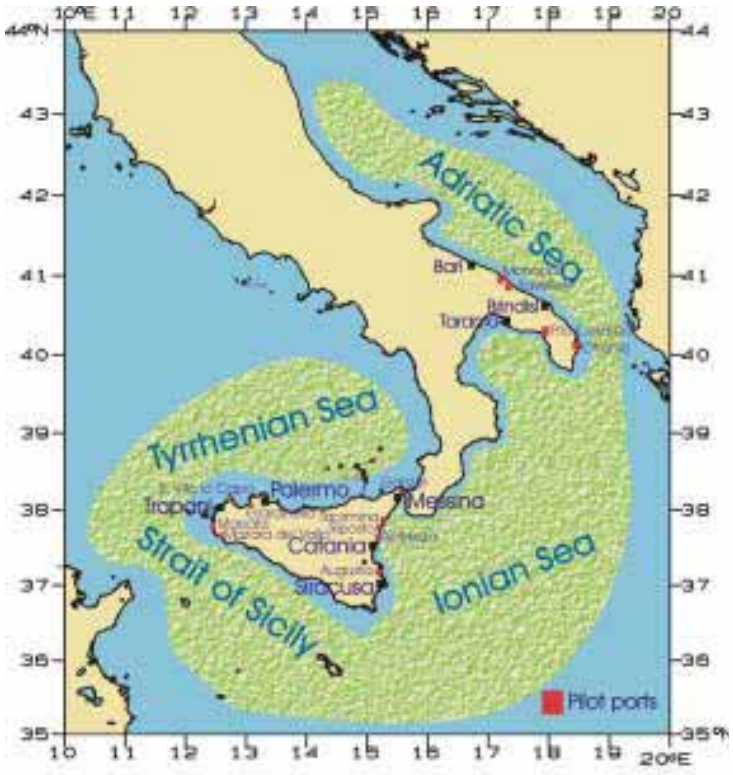

Figure 2: Fishing grounds of the pelagic longline fisheries

Social and economic importance and discarding practices

Discarding depends on the economic value of the fish: where there is a market demand for sharks discards are minor, mainly limited to small sized individuals caught in the trawl fisheries.

The different species of sharks caught in the North Adriatic and South Ionian longline fisheries have a commercial value and therefore are not discarded. The price of shark meat on wholesale markets is quite variable, ranging from Euro 1–2 per kg in different fisheries and seasons.

In the Sicilian fisheries, shark bycatch is usually discarded at sea. This is mainly due to the fact that these boats, fishing for swordfish, make long trips and therefore fishers prefer to leave the available storage space for more valuable species. In the northern Tyrrhenian Sea, the trawl fisheries directed to the Norwegian lobster also capture locally significant number of *E. spinax* and *Galeus melastomus*. Often the largest individuals of the latter are skinned on board and landed.

Main species in catch statistics

Fairly all the catches of sharks, skates and rays are reported as "smoothhounds nei" (60%) and "rays, stingrays and mantas nei" (40%). It should be stressed that these two categories do not correspond to taxonomic groups, at least not for the Italian catches. The reported catches of smoothhounds nei often consist of an aggregation of small-sized demersal sharks including *Mustelus* spp. (the true smoothhounds), *Squalus* spp., *Centrophorus* spp., *Dalatias licha*, *Scyliorhinus* spp. and *Galeus melastomus*. This is due to the fact that these shark species are usually marketed headed, skinned and gutted, and sold under the commercial name of "palombo", the Italian common name of *Mustelus*. In the same way, the FAO category "rays, stingrays and mantas nei" is an aggregation of all batoids; the bulk of these catches taken in Italy consist of three species of skates: *Raja clavata*, *Raja asterias* and *Raja miraletus*.

International trade and domestic use

The international trade of sharks and rays in Italy reflects and is a consequence of the catches both in Mediterranean and in the European countries.

In 2004 the total shark catches in the Mediterranean (FAO data) amounted to 7 000 tonnes, mainly caught in Tunisia (29%) and Egypt (18%). The Italian catches (around 1 000 tonnes), represented only 14% of the catches in Mediterranean. Furthermore, shark catches of the Italian fleet outside the Mediterranean are negligible. The reported catches for the European Union (EU) countries in the same year was around 110 000 tonnes. Spain took the largest share with about 46% of the EU total, followed by France with 20% and United Kingdom with 15%. Other countries with significant catches of sharks are Portugal, Germany, Denmark and Norway. Among the EU countries the Italian catches of elasmobranches represent only 1% of the total.

Because of the bio-ecological features of the seas, the shark production of the eastern Atlantic and the northern seas is more than 10 times larger compared to the Mediterranean Sea.

In this international context is quite obvious that Italy import sharks and rays form the countries with a far larger production, mainly from Germany and Spain. The average import is quite stable along the years, around 10 000 tons a year, mainly (90%) constituted by frozen fish (Vannuccini, 1999). This amount corresponds to a consumption of less than 200 grams a year *per capita* in the Italian population and looks realistic if not an underestimate.

National Plan of Action

The *"Linee guida per la formulazione di un piano d'azione nazionale per la tutela dei pesci cartilaginei"* (Guidelines for the implementation of an action plan for the protection of cartilaginous fish) was firstly elaborated in 2001 and then revised in 2007 by Vacchi and Serena (ICRAM, 2007). The document was prepared for the Environmental Ministry (MATTM) and inserted in the «Objectives 99» of ICRAM with the Deliberation of Administrative Council n° 1/99 on 12 January 1999.

The Plan is aimed at the evaluation of the conservation status of cartilaginous fishes, sharks, rays and chimeras in the Italian seas. The species taken into consideration are the 78 reported by the checklist of the Italian fauna, revised by Relini in 2007.

2. DATA AVAILABILITY AND FISHERY MONITORING SYSTEMS

Organizations involved

The management of fisheries in Italy is primarily due to the Ministry of Agriculture and Forestry (MiPAF), but many aspects can be administered by local authorities such as Region, county (Provincia) or even town (Comune).

The main institutions and research centres involved for decades in fisheries studies in Italy are listed in Table 1, which includes the GFCM Geographical Sub Areas (GSA) for geographical reference, where appropriate. Moreover there are many other public and private bodies with significant importance either on local scale or in very specialized sectors, with some relationship with the fisheries, aquaculture, fish genetics, among others.

Table 1: Main institutions involved in fisheries studies in Italy

Acronym	Institution name	Location	GSA
ARI	Acquastudio Research Institute	Messina	
ARPAT	Environmental Protection Agency-Tuscany Region	Livorno	9
CIBM	Interuniversity Centre of Marine Biology	Livorno	9
CnrAN	ISMAR – Institute for Marine Science	Ancona	
CnrMA	Coastal Marine Environmental Institution-CNR	Mazara del Vallo	16
CnrME	Coastal Marine Environmental Institution-CNR	Messina	10
CnrVE	Institute for Marine Science	Venezia	
COISPA	Technology and Research	Bari	10
CoNISMa	Consorzio Nazionale Interuniversitario per le Scienze del Mare	Rome	
ISPRA	Superior Institute for environmental research (ex ICRAM)	Rome	
LBMB	Provincial Laboratory of Marine Biology	Bari	18
UniBA	Biology Dept. University of Bari	Bari	19
UniBA	Veterinary Dept. University of Bari	Bari	
UniBO	University of Bologna	Fano	17
UniCA	University of Cagliari	Cagliari	11
UniGE	University of Genoa	Genoa	9
UniRO	University of Rome	Rome	9

The Italian Society of Marine Biology (SIBM) coordinates a large number of institutional bodies involved in fisheries data collection along the thousands of kilometres of the country coastline. Mainly because the artisanal fisheries are scattered in hundreds of ports and landing sites, data collection relies on local maritime authorities and on the local research centres. These can be university departments, laboratories of the National Research Council (CNR), Environmental Agencies and other governmental or private institutions. Examples of organizations involved in monitoring of landings in local areas are ARPAT and CIBM in Tuscany, CNR and ICRAM in Sicily.

Most of the economical data on fisheries arise since decades from the IREPA Institute (Istituto di Ricerche Economiche per la Pesca e l'Acquacoltura), while most comprehensive data are available from the ISTAT Institute.

Coordination

Before 1970, most of the research programs aimed at the assessment of fish resources where coordinated by the National Research Council (CNR). Later on in the 80s, the CNR-IRPM of Ancona carried on a wide program aimed at optimising fisheries statistics, including the landings in the main Italian ports. In this framework it was created the Italian Research Institute for Fishery (ICRAP), but soon after this institute changed its target concern, focusing more attention to environmental aspects. Since 1985 the Agriculture Ministry (MiPAF) directly coordinates most of the research programmes on fisheries by giving the running direction firstly to the Operative Units (Universities, Research Centres, Environmental Agencies) and subsequently to the Italian Society of Marine Biology (SIBM) with a coordination unit for each GSA.

The previous programs were generally addressed to biological assessment and technological aspects of the fisheries. Meanwhile, for 30 years, the IREPA, from Salerno, carries on data collection and statistical investigations addressed to the economical, commercial and social aspects of fisheries, including landings estimations. Recently the ministry has transferred the competence on the fishery sector from the ISTAT to IREPA.

In recent years, and in connection with the EU data collections, IREPA has taken the coordinating role in the optimisation of the sampling scheme aimed at a detailed fisheries data collection among the Operative Units along the whole Italian coast.

Type of fishery data

In the last FAO-GFCM SAC Subcommittee on environment and ecosystem (Rome, 2008) a report was presented with an updated bibliographic review of scientific papers on catches and other biological information of elasmobranchs in the Mediterranean collected in the last 15 years. Specifically to Italian waters there were 19 papers with information on the Ligurian and Tyrrhenian seas (GSA 9 and 10), 12 papers on the Ionian sea (GSA 19 and 20), 12 on the Adriatic Sea and 2 on the Sicily Straits.

Most of the available data derives from scientific campaigns, landings monitoring programmes and research projects. On a national scale, the most relevant are Grund (from 1985), Medits (from 1994), Discard (from 2004) and Campbiol (from 2005).

The Mediterranean Large Elasmobranchs Monitoring program (MEDLEM program, Serena, Mancusi and Baroni, 2008) started in 1985 at a national level and its field data sheets have been requested and widely distributed among many Mediterranean research centres. This fact expresses the willingness of many countries and organization to cooperate on this subject and to conform in the collection of data. Also IUCN (International Union for Conservation of Nature and Natural Resources) and EEA (European Elasmobranch Association) endorsed the project showing a great interest and a positive appreciation of the concept. The coordination of this program is carried out by ARPAT (Italy).

The MEDLEM database application is a user-friendly computerized system (Figure 3) designed to facilitate the sharing of data between participants in this programme with a direct access from the FAO site www.gfcm.org

Furthermore, the MEDLEM database provides an updated source of information on large cartilaginous fishes for national and international organizations involved in the management and the conservation of these marine vertebrates in the Mediterranean Sea. The application allows the data entry on catch, sighting, stranding or bibliographic reference, or a search for species, country and gear.

One practical example of the use of the bycatch and incidental catches data stored in the MEDLEM database is to assess the more common species in the Mediterranean basin. Another important aspect of this project is the collection of scientific papers related to elasmobranchs in the Mediterranean area. About 400 bibliographic references are currently listed in the program database.

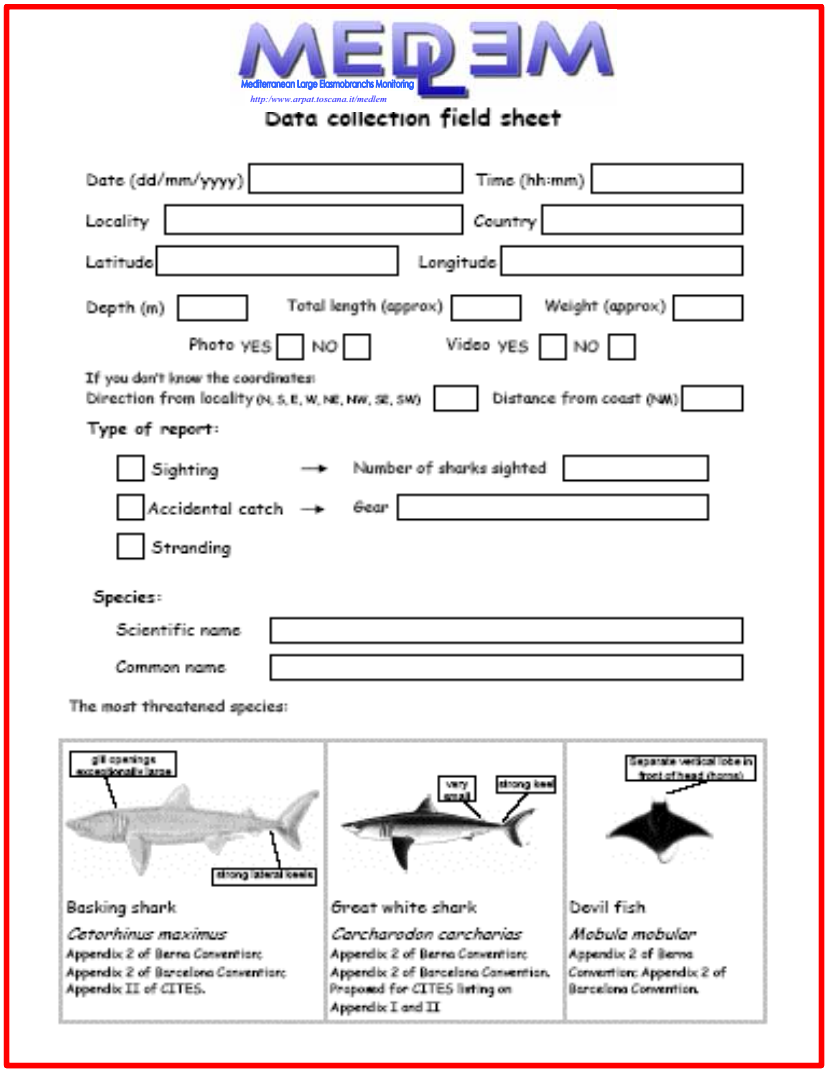

Figure 3: Data entry form of the MEDLEM program

The first data collated by the program (for a great part represented by bibliography information) was from Italy, Croatia, Spain, France, Malta, Tunisia, Greece and Slovenia. Figure 4 shows an updated overview of the database in terms of relative distribution of records by country. Up until now about 1 300 records have been inserted in the database (Figure 5). The largest part of the data (647 records) relates to basking shark, but also bycatch and incidental catches of other species are reported, such as great white shark, *Isurus oxyrinchus, Alopias vulpinus, Hexanchus griseus, Mobula mobular*, among others.

Regional fishery management organization

The General Fisheries Commission for the Mediterranean (GFCM) has been for a long time the main reference point for the fishery assessment and for management advice in the Mediterranean. The area of jurisdiction of the Commission includes many countries (around 25) characterized by different cultures, political situations and environmental settings.

Although some coordination bodies (e.g. related to the Grund and Medits projects) are involved in data management of elasmobranchs, generally in Italy data is managed on a Geographical Sub Areas scheme and on the origin of the data (surveys, landings, observation, etc.). Only in some specific cases (e.g. E.U. Raja project FISH/2004/03–41, coordinated by ARPAT) the data from the different GSAs and sources have been handled together to assess the exploitation status of the main species. Some of these results have been presented in the working group of demersal species of the GFCM-SAC Sub-Committee on Stock Assessment held in Izmir (Turkey), 15–19 September 2008.

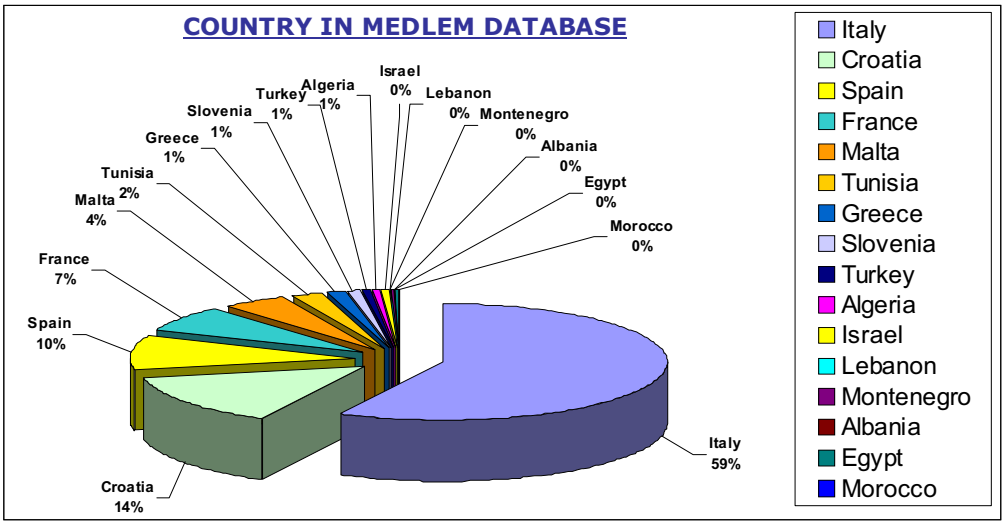

Figure 4: Countries with information in the MEDLEM database.

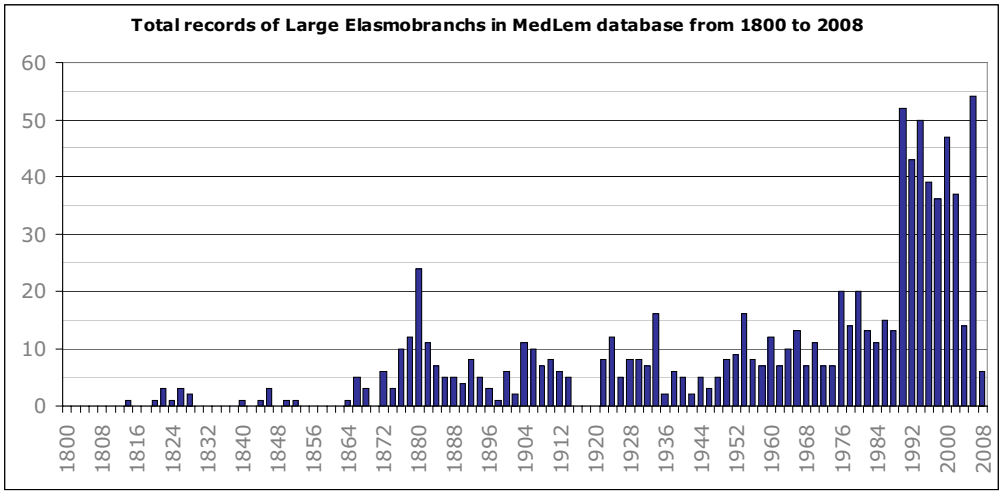

Figure 5: Total records in the MEDLEM database from 1800 to 2008.

FAO catch data

Italian catch reporting of elasmobranchs from the various sources (Eurostat, Fishstat, Istat) are basically coherent but show an inconsistency related to Ionian catches between 1985 and 1995 with values around 12 000 tons/year, which have no likely explanation (Figure 6). It is acceptable that the principal fishing country in the Ionian Sea is Italy, even though from 1998 the Tunisian (and maybe Libyan) catches may have highly increased in the southern part of the FAO GFCM Geographical Area 2.2 (Figure 7).

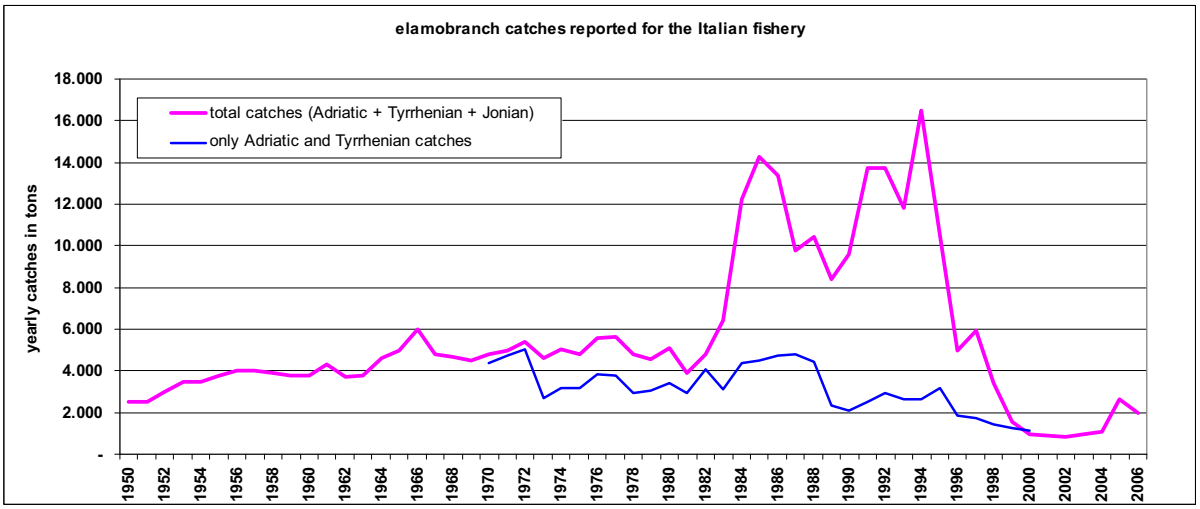

Figure 6: Reported catches (tonnes) of elamosbranchs by Italy (source FAO)

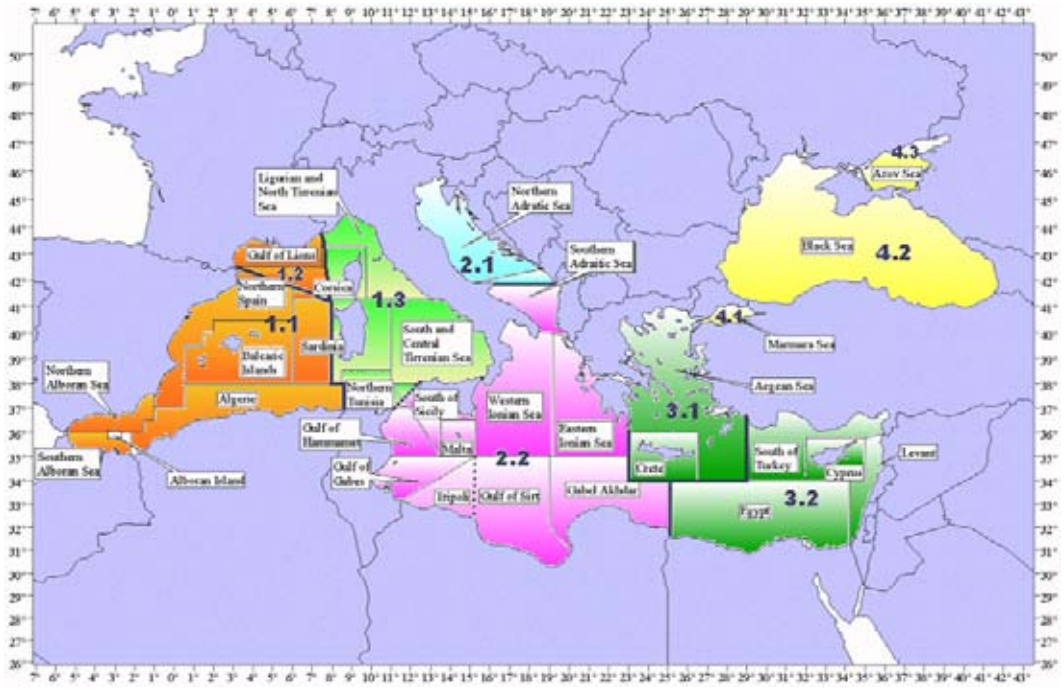

Figure 7: GFCM Geographical Areas

An improvement of the data collection system established in Italy since 1983 (see Bazigos *et al.*, 1984) may explain the increase of the catches of Italy in the Ionian Area. The fast decline of the catches observed since 1995 may be related either to the reduction of the size of the Italian artisanal and bottom trawl fleets or to a possible local depletion of elasmobranch stocks.

Nevertheless, the large amount of catches in the Ionian sea are reported as smoothhounds nei (60%) and rays, stingrays and mantas nei (40%) and this is quite surprising since in the Italian Ionian Sea the rays are very scarce and yearly catches of up to 4 000 tonnes seems unrealistic.

Main problems

In respect to elasmobranchs catches in Italy, the more evident inadequacy consists on the excessive grouping of the species; often catches are reported only in the two categories: “smoothhounds nei” and “rays nei”. Even if this reflect quite well two fisheries types (trawl and longlines) problems arise for instance when trying to discern catshark bycatch in trawl fisheries or the species caught in different environments, i.e. coastal or deep water, demersal or pelagic species.

Another problem is the absence of a single database holding the results of the various research programmes, which hampers the possibility of comparison and validation of different sources of information on catches, landings or standing stock estimates. This problem is due in part to the difficulties of coordinating the data storage from the numerous research structures, integrating biological and economical assessments from different sources and to standardize estimates of units of effort (e.g. swept area, setnets length and hook numbers).

Finally, concerning the approval of the National Plan of Action for Sharks, the procedure is still ongoing because the historical overlapping of competence of the Environmental Ministry (MATTM) and the Agriculture Ministry (MIPAF).

Improvement of monitoring

Some years ago, following a FAO request, a training programme was planned aimed to set a Mediterranean network for the improvement of the collection of elasmobranch statistics. This "Training course on taxonomy and data collection of Mediterranean cartilaginous fish” was planned in the framework of FAO Regional Programs such as GFCM, COPEMED, MEDSUDMED, ADRIAMED and EASTMED.

The main goal of the course was the strengthening of scientific cooperation through joint data collection and analyses of the scientific information previously available on cartilaginous fish in the Mediterranean and Black Sea. Furthermore, this training course was conceived for giving an opportunity for junior scientists to improve their professional skills in the identification of sharks and rays and to perform a joint assessment of large elasmobranchs fish, endangered cartilaginous species and other elasmobranchs collected during scientific campaigns.

The training course was addressed to researchers from Mediterranean countries with the following themes:

1) Introduction to the elasmobranch taxonomy
2) Overview of the background knowledge on elasmobranch fisheries assessment and management techniques.
3) Conservation and long-term dynamics of cartilaginous fish in the Mediterranean Sea; their decline in biodiversity.
4) The importance of the MEDITS trawl surveys for the knowledge of diversity and distribution of elasmobranchs in the Mediterranean. How to organize a single database
5) Taxonomy and field techniques for identification based on *The field identification guide to the sharks and rays of the Mediterranean and Black Sea* (Serena, 2005) and *Standardization of the identification methods and stock assessment approaches to rays of the Mediterranean Sea* (Serena *et al*., in press)
6) Large elasmobranch data collection and database organization based on the MEDLEM project.
7) The use of a standard protocol for specimen collection, preservation and cataloguing.

Unfortunately it was not possible to implement the course because no funds were available at the time.

3. MONITORING OF TRADE IN SHARK PRODUCTS

Organizations for monitoring of international trade

The main governmental agency responsible for the monitoring of trade and many other matters is the Istituto Nazionale di Statistica (ISTAT).

Since decades, following the European Regulations and mandated by the MIPAF, IREPA collects data on elasmobranch species by means of periodic visits to the main fish markets and landing sites along the Italian coasts. For each region, data are collected on the following group of species recording the weights of fishes and their prices at landing:

- catsharks – gattuccio
- smoothhound – palombo
- spurdog – spinarolo
- blue shark – verdesca
- thorback ray – razza chiodata
- brown ray – razza quattrocchi

Monitoring of trade

The monitoring of international trade in sharks products is conducted as follows:

- Customs are the main points of control
- Spurdog and smoothhound are the main types of products in trade
- Italy imports (about 13 000 tonnes in 2005) from about 30 countries. In recent years the most important of them were Spain, Argentina and the Netherlands. Very low quantities are exported (less then 300 tonnes/year)
- No particular tariffs is charged for sharks species
- Because many shark species are assembled for the trade, the identification of species is difficult
- The shark commodities are often sold with the name of "palombo" or "verdesca" even if they are similar species
- Trade controls follows the common rules for food traffic, with no other specific restriction for fish trade.
- There is no trade of protected species, *sensu* CITES (i.e., whale shark, basking shark and great white shark) in Italy.

FAO trade data on sharks

About 98% of the Italian trade in cartilaginous species (10–15 thousand tonnes a year) is represented by imports, while exports account for only 2% of the total trade (around 200 ton/year) (Figures 7 and 8). Exports are irrelevant because the Italian catches of elamosbranchs are much smaller than the national consumption. In both imports and exports, frozen fish represents 90% of the total and the only identified species are *S. acanthias* and *S. canicula* (11% together); all other frozen fish are grouped as "sharks nei". For the last 20 years, the trend in imports (representing approximately 10 times the Italian catches) seems to be quite stable.

In any case the price of fresh and frozen sharks in wholesale trade is fairly low (about Euro 4/kg and Euro 2/kg, respectively) (Figure 9).

Improve the monitoring of trade

Monitoring of trade in Italy is poor and particularly difficult due essentially to:

– difficulties in identifying the species
– lack of technical capacity of customs officers

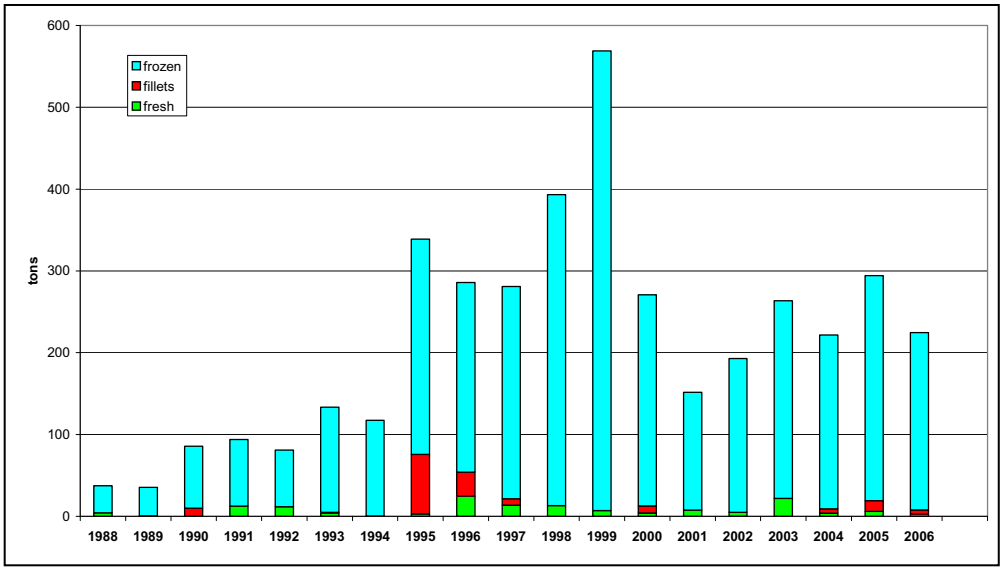

Figure 7: Italian exports of sharks (source FAO)

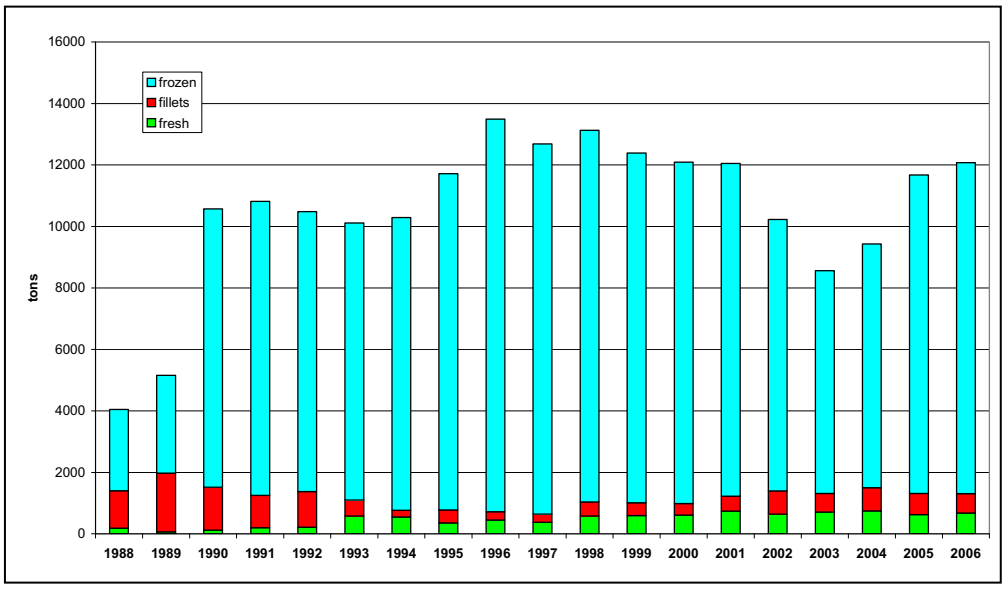

Figure 8: Italian imports of sharks (source FAO)

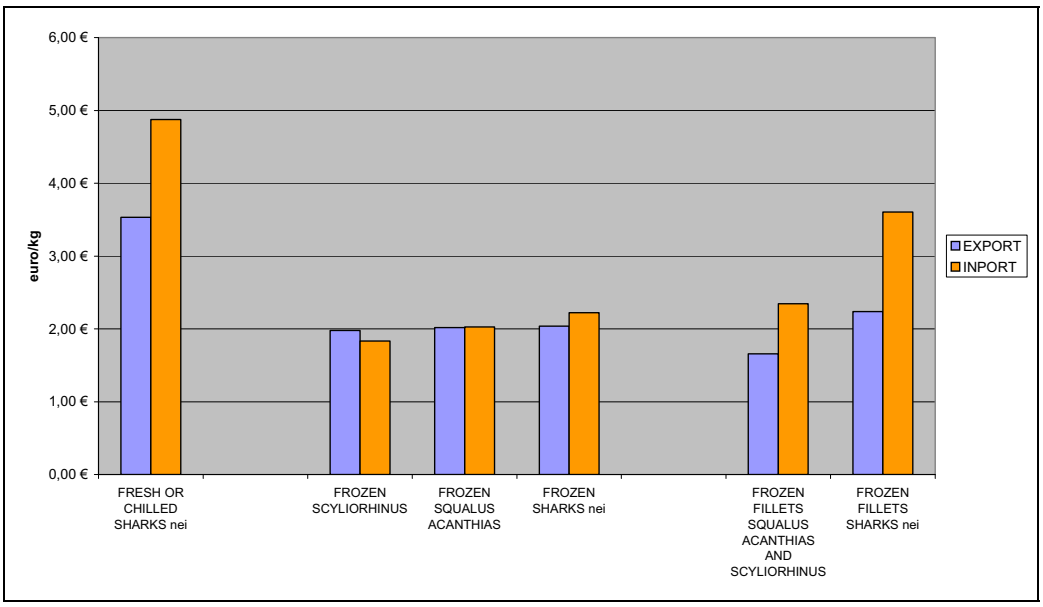

Figure 9: Average price of shark categories in Italian international trade (1988–2006) (Source FAO)

References

Abella, A.J., Mancusi, C. and Serena F. 2008 – Assessment of Raja asterias and Raja clavata in the north western Mediterranean Sea (GSA9) – Subcommittee on stock assessment working group of demersal species Izmir, Turkey 15–19 sept 2008.

Aldebert, Y. 1997. Demersal resources of the Gulf of Lions (NW Mediterranean), Impact of exploitation on fish diversity. *Vie & Milieu*, 47 (4): 275–284.

Bazigos, G.P., Cingolani, N., Coppola, S.R., Levi, D., Mortera, J. and Bombace, G. 1984. Studio di fattibilità per un sistema di rilevazione campionaria delle statistiche della pesca (PESTAT). Parte II – Statistiche sulle catture e sullo sforzo di pesca. – Min. Mar. Merc., Ancona. Quaderni dell'Istituto Ricerche Pesca marittima–CNR Vol. IV n 1 Suppl. 1–358.

Bertrand, J., Gil De Sola, L., Papaconstantinou, C., Relini, G. and Suplet, A. 1997. An international bottom trawl survey in the Mediterranean. The MEDITS program 1997. *ICES Annual Science Conference*, CM 1997/Y: 03: 1–16.

Boero, F. and Carli, A. 1979. Catture di elasmobranchi nella tonnarella di Camogli (Genova) dal 1950 al 1974. *Boll. Mus. Ist. Biol. Univ.* Genova, 47: 27–34.

Costantini, M., Bernardini, M., Cordone, P., Giuliani, P.G. and Orel G. 2000. Observations on fishery, feeding habits and reproductive biology of Mustelus mustelus (Chondrichthyes, Triskidae) in Northern Adriatic Sea. Biol. Mar.Medit., 7(1): 427–432.

Cushing, D.H. 1988. The Provident Sea. Cambridge University Press, 329 pp.

De Metrio, G., Cacucci, M., Deflorio, M., Desantis, S. and Santamaria, N. 1999. Incidenza della pesca dei grandi pelagici sulle catture di squali. *Biol. Mar. Medit.*, 7(1): 334–345.

De Metrio, G., Petrosino, G., Montanaro, C., Matarrese, M., Lenti, M. and Cecere, E. 1984. Survey on summer–autumn population of Prionace glauca L. (Pisces, Chondrichthyes) in the Gulf of Taranto (Italy) during the four-year period 1978–1981 and its incidence on sword fish (Xiphias gladius) and albacore (Thunnus alalunga) fishing. *Oebalia*, 10: 105–116.

ICRAM. 2007. Linee-Guida per la formulazione di un piano d'azione nazionale per la tutela dei pesci cartilaginei (squali, razze e chimere). ICRAM, Roma, 20 giugno 2007.

Mancusi, C., Clò, S., Affronte, M., Bradai, M.N., Hemida, F., Serena, F., Soldo, A. and Vacchi, M. 2005. On the presence of basking shark (*Cetorhinus maximus*) in the Mediterranean Sea. *Cybium* 29(4): 399–405.

Notarbartolo di Sciara, G. and Serena, F. 1988. Term embryo of Mobula mobular (Bonnaterre, 1788) from the northern Tyrrhenian Sea (Chondrichthyes: Mobulidae). Atti Società Italiana di Scienze Naturali, Museo Civico di Storia Naturale, Milano 129(4):396–400.

Orsi-Relini, L., Coma, C., Garibaldi, F., Calandri, G., Relini, M. and Torchia, G. 1999. La pesca professionale con i palamiti galleggiante nel "Santuario dei Cetacei" del Mar Ligure: si tratta d'attivi ecocompatibili? *Biol. Mar. Medit.*, 6: 100–109.

Orsi Relini, L., Garibaldi, F., Digitali, B. and Lanteri, L. 2002. Abundance of the pelagic stingray, (Pteroplatytrygon [Dasyatis] violacea), in the Ligurian Sea, with preliminary notes about its feeding and growth. In: Proc. 4th European Elasmobranch Assocation meeting, Livorno, Italy (Vacchi M., la Mesa G., Serena F. and Séret B., eds), ICRAM, ARPAT and SFI.

Relini, G. 1998. Valutazione delle Risorse Demersali. *Biol. Mar. Medit*., 5 (3) parte prima: 3–19.

Relini, G., Bertrand, J. and Zamboni A. (eds). 1999. Synthesis of the knowledge on Bottom Fishery Resources in Central Mediterranean (Italy and Corsica). *Biol. Mar. Medit*., 6 (Suppl.1).

Serena, F. 2005. Field identification guide to the sharks and rays of the Mediterranean and Black Sea. FAO Species Identification Guide for Fishery Purposes. Rome, FAO. 2005. 97p. 11 colour plates + egg cases.

Serena, F. and Abella, A.J. 1999. Assessment of the effects of fishing on demersal assemblages of the North Tyrrhenian Sea with special references to Raja asterias. Abstract in: ICES/SCOR Symposium on Ecosystem effects of Fishing. Montpellier, France.

Serena, F. and Vacchi, M. 1997. Research on large cartilaginous fishes in the Northern Tyrrhenian and Ligurian Seas conducted in the context of the L.E.M. (Large Elasmobranchs Monitoring) program. *Quad. Civ. Staz. Idrobiol*., 22: 121–123.

Serena, F., Mancasi, C., Barone, M. 2008. The MEDLEM database application: a tool for storing and sharing data about bycatch and incidental catches of large cartilaginous fishes in the Mediterranean basin. SAC - Sub-Committee on Marine Environment and Ecosystems (SCMEE/Sub-Committee on Stock Assessment (SCSA) FAO, Rome, 15–16 September 2008.

Serena, F. *et al.* 2008. Status of rays populations in the Mediterranean Sea and advice for sustainable exploitation of the stocks - E.C. DG Fish. Project FISH/2004/03–41.

Shotton, R. 1999. Case studies of the management of elasmobranchs fisheries - FAO Fisheries Technical Paper 378 vol 1 & 2 Rome.

Vacchi, M., Biagi, V., Paletta, R., Fiordiponti, R., Serena, F. and Notarbartolo di Sciara, G. 2002. Elasmobranch catches by tuna trap of Baratti (Northern Tyrrhenian Sea) from 1898 to 1922. In: Proc. 4th European Elasmobranch Assocation meet.ing, Livorno, Italy (Vacchi M., La Mesa G., Serena F. and Séret B., eds), 177– 183. ICRAM, ARPAT and SFI.

Vannuccini, S. 1999. Shark utilization, marketing and trade. FAO Fisheries Technical Paper 389. Rome, FAO.

JAPAN

Hideki Moronuki
Ecosystem Conservation Office, Fisheries Agency

1. Background information about the shark fisheries

FAO capture production data show that global catches of sharks, skates and rays (elasmobranch) have continuously increased from about 200 000 tonnes per year the 1940s to about 800 000 tonnes per year after 1996. In contrast, elasmobranch catches by Japan, which once exceeded 100 000 tonnes per year in the 1940s, have continuously declined since then to a level of 20 000 to 30 000 tonnes per year. This decline in catches by Japan may be attributed to a decreasing demand for shark, skate and ray products (Figure 1).

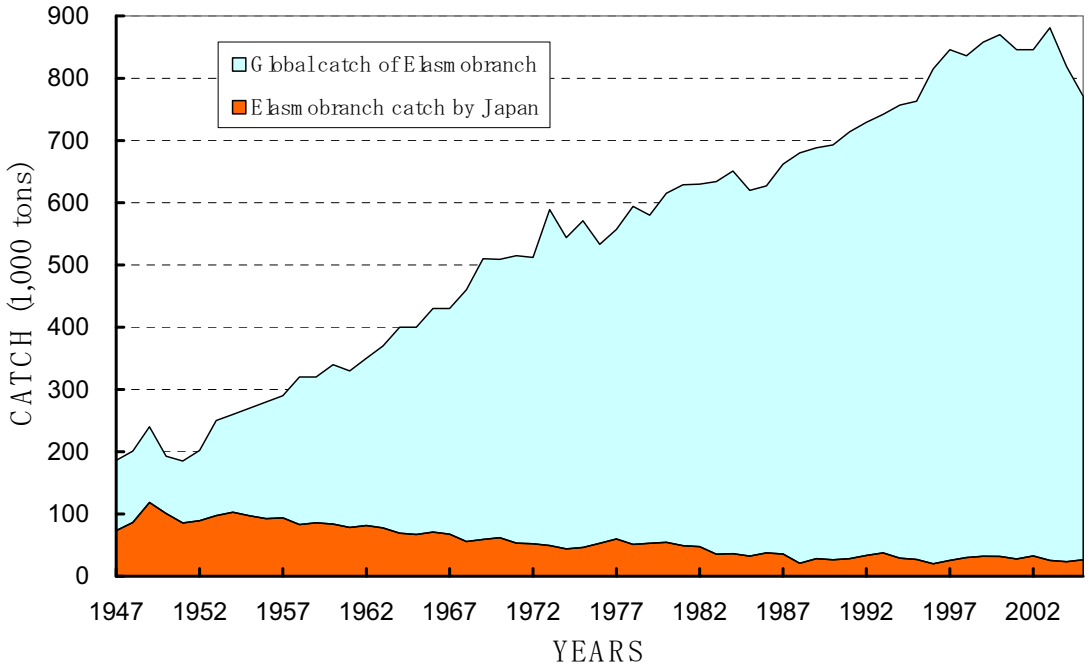

Figure 1: Elasmobranch catches by Japan and worldwide (1947–2005, FAO, 2007)

Elasmobranch fisheries in Japan

Major elasmobranch species groups caught by Japanese fisheries are classified into three groups: pelagic, demersal and coastal. Tuna longline is the major fishery which catches pelagic species, though high seas driftnet fisheries were once major players. Japan's elasmobranch catches exceeded 70 000 tonnes per year in the 1950s, but then gradually declined to 20 000–30 000 tonnes per year in the 1990s and thereafter. The main cause of the decline was the decrease in landings of demersal sharks and rays from the bottom trawl fishery. Although catches of pelagic sharks by tuna longline fisheries also gradually decreased from the level of 20 000 tonnes per year in the 1980s to 15 000–20 000 tonnes per year in the 1990s, and recovered once again to the 20 000 tonnes per year level in the 2000s (Figure 2). Of the total shark catches, catches by tuna longline fisheries, including direct catch of sharks as main targets, comprised 71–87 percent, while shark bycatch by the same fisheries 58–84 percent in the period of 1994–2005. Japanese tuna longline fishing vessels are operating almost all over the world including the Pacific, the Indian and the Atlantic Oceans.

Although there are difficulties in estimating the number of people involved in shark fisheries, it is naturally considered that the number has been decreasing substantially taking into account the fact that the number of tuna longline vessels has decreased in about 20 percent in the 2000s.

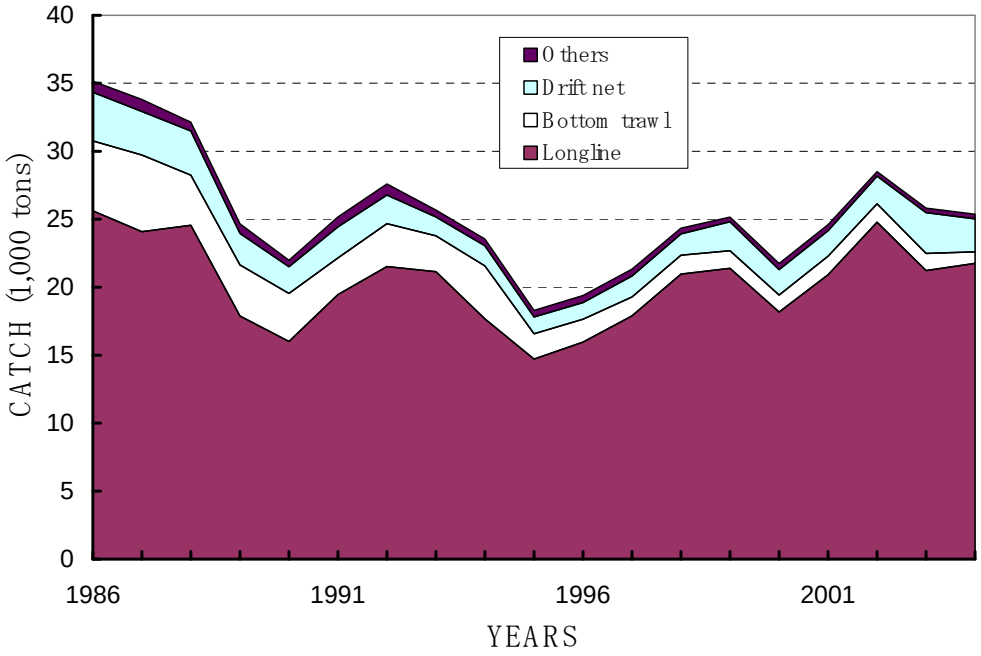

Figure 2: Shark catch by type of fishery (Statistical and Information Division, Ministry of Agriculture, Forestry and Fisheries, 1986–2004)

Contribution of shark fisheries to the national economy in Japan is quite small, and its contribution to the fisheries sector is also very small (0.3–0.5 percent in volume). However, in some particular regions, the importance of shark fisheries has been relatively high reflecting regional food culture and tradition. For example, at Kesennuma of the Miyagi prefecture situated in the Tohoku region (northern part of main island of Japan), contribution of shark catch to its all fishery landings in 1999–2006 were much higher than the national average, ranging between 12.0–21.9 percent in volume, and notably its contribution in value has been gradually increasing from 8.5 percent to 13.3 percent during the same period.

Blue shark is the most commonly caught species in tuna longline fisheries. Before the 1990s, this species used to be discarded at sea, except in near–shore fishing grounds, because of its low market value at that time in Japan. However, in recent years, since their commercial value as food has increased, especially in overseas markets, landings at overseas ports have become increased. Landings of blue shark in 1992–2006 were 10 000–16 000 tonnes per year, accounting for 70–80 percent of the total landings of pelagic sharks (Figure 3).

Shortfin mako is often landed in Japan even by distant-water longline vessels because of their high-quality meat and high commercial value. Landings of shortfin mako in 1992–2006 were 800–1 500 tonnes per year, accounting for 5–8 percent of the total landings of pelagic sharks.

Salmon sharks are mainly landed in the Tohoku region centering on Kesennuma. The commercial value of this species is high because of its high-quality meat, and in addition to its use as food, fins and skins are used for handicrafts. Landings of salmon shark in 1992–2006 were 1 400–4 400 tonnes per year for longline and driftnet fisheries combined, accounting for 8–22 percent of the total landings of pelagic sharks.

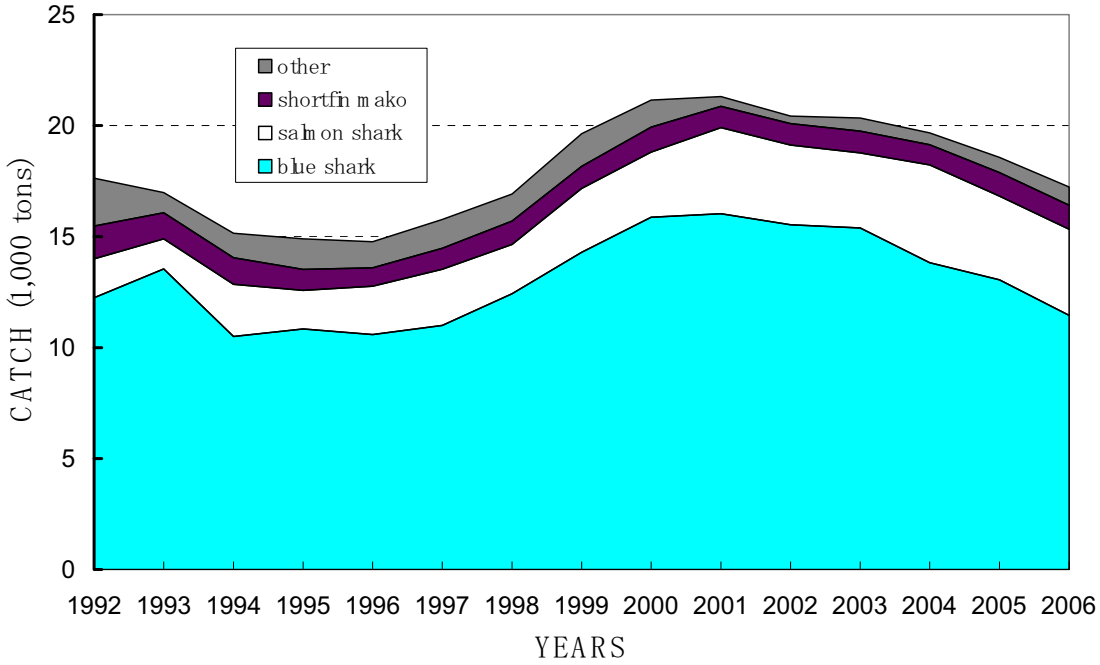

Figure 3: Landed weight of pelagic sharks by species (Fisheries Agency/Fisheries Research Agency, 1992–2006)

Of the other pelagic sharks (oceanic whitetip shark, silky shark, bigeye thresher, crocodile shark), crocodile shark is never used for commercial purpose, even for its fins. According to data from 1992–2005, landings of these species were reported at 2–85 tonnes per year for oceanic whitetip shark, and for thresher shark including bigeye thresher at 250–700 tonnes per year. Landings data for silky shark are not available as this species is not recorded separately, but landings of requiem sharks as a group are reported at 30–130 tonnes per year (Fisheries Agency/Fisheries Research Agency 1994–2007).

Regarding the three species of large sharks, i.e. whale shark, basking shark and white shark, a harpoon fishery targeting basking sharks existed in the 1960s, but, at present, there are no such fisheries targeting these species.

Development and implementation of the NPOA

Following the adoption of the IPOA-Sharks at the twenty-third session of the FAO Committee on Fisheries (COFI) in February 1999, Japan developed its National Plan of Action (NPOA-Sharks) and submitted it to FAO at the occasion of the twenty-fourth COFI in March 2001. Japan is now striving to obtain ensure scientific knowledge and information regarding shark resources under its NPOA-Sharks, and also to ensure rational conservation and sustainable use of shark resources based on such knowledge. Japan submitted reports on its assessment of the implementation of the NPOA-Sharks to the twenty-fifth and twenty-sixth sessions of COFI in 2003 and 2005 in accordance with paragraph 28 of the IPOA-Sharks.

2. Data availability and fishery monitoring systems

Fisheries Agency of Japan (FAJ), one of the agencies belonging to the Ministry of Agriculture, Forestry and Fisheries (MAFF), is responsible for the monitoring of fisheries that catch sharks, with the support by the Fisheries Research Agency of Japan (FRA) in scientific and data-gathering aspect.

Japan has actively participated in almost all RFMOs which are responsible for fisheries management within regions where sharks are caught by Japanese fishing vessels both directly and incidentally. Among those RFMOs, Japan has provided ICCAT with information on catches and landings of sharks in tuna longline fisheries in the Atlantic Ocean for its stock assessment of pelagic sharks in the region. It is foreseen that similar provision of shark information by Japan would be made to other RFMOs in the future.

Data and information on shark catches are collected by FAJ and compiled by FRA through logbooks, observers and research vessels as well as training vessels belonging to high schools and universities. Logbooks provide various types of information including landing by species, number, weight, location of catches and landing ports. In the case of landing at ports in Japan, provision of detailed information in weight and value is mandatory, while conversion factor is used for estimating weight when landed at foreign ports, usually, in the form of headed and gutted. Bycatch data by species have been also collected through logbooks since 2007. Since most of sharks are caught as bycatch in tuna longline fisheries, fishing effort on sharks could be monitored through review of tuna longline fisheries.

Standardized CPUEs which could be used as one of indicators of resource abundances are calculated for various species in their main fishing grounds and provided to respective RFMOs concerned.

For many species of sharks, erroneous species identification might occur during monitoring by observers and/or catch recording by fishing vessels. In order to rectify such situation, several identification tools are elaborated and distributed to fishermen, such as desk pads, brochures and posters. Also, an identification guidebook for observers on board fishing vessels and research vessels is prepared, which contains species identification manual not only for shark species but also for fish, seabirds, sea turtles and others.

Data and information derived from logbooks, observers and through various research activities are compiled and stored at the National Research Institute of Far Seas Fisheries of FRA.

Difficulties and problems encountered

Since the issues surrounding management of sharks have become highlighted relatively recently, there remains a need of improvement in such areas as efficient research and monitoring. Unlike the situation for tunas, swordfish and marlins, since there are no long-term time series of data on both catch and bycatch of sharks, there is still difficulty to grasp long term trend that can be used for stock assessment.

Although there are no fisheries targeting large sharks these days, these species sometimes stray into set nets accidentally. For this reason, there is a need to establish an appropriate mechanism to systematically collect information on incidental catches of large sharks in set nets.

3. Monitoring of trade in shark products

International trade in general is under the responsibility of the Ministry of Economy, Trade and Industry (METI) in cooperation with Ministries/Agencies concerned. Monitoring and control of trade as well as compilations of trade data and information are under the responsibility of the Ministry of Finance (MOF), and thus controls of shark products are conducted at each customs by MOF mainly from the view point of preventing illegal trades. Information on imports and exports in shark products are also compiled by MOF through data collections at customs clearance. FAJ is only responsible for the control and monitoring of specific fisheries products on which international regulations are established by RFMOs and/or international organizations such as ICCAT and CITES.

Japan exports mainly frozen shark meat and dried shark fins and imports almost only frozen meat. During 1998–2007, exports of frozen shark meat have gradually increased from 2 050 tonnes in 1998 to 3 612 tonnes in 2007 (peak: 4 266 tonnes in 2005), while those of dried shark fins have gradually decreased from 347 tonnes in 1998 to 197 tonnes in 2007 (bottom: 168 tonnes in 2005). During the same period, imports of shark products (mostly frozen meat) fluctuated from 885–1 443 tonnes and did not show any clear trend.

Main destination countries of frozen shark meat export include South Africa, Spain, Peru, China and Korea. However, most of exports to South Africa, Spain and Peru are considered “landings” at foreign ports by Japanese tuna longline vessels. Therefore, in terms of “true” export, China, Korea and Vietnam are considered to be main destination countries. Dried shark fin is mainly exported to China, Hong Kong SAR, China and Singapore, being most of it (85–90 percent) exported to China, Hong Kong SAR. Main import countries of frozen shark meets include Spain, Canada, China and Indonesia.

Shark products are subject to import tariffs. Tariff level for dried shark fin is the same as most of other dried fish products (10.5 percent) while those for fresh and frozen shark meats are 2.5 percent, slightly lower than the level applied to most of other fish species (3.5 percent).

There is no identification of species on shark products to be traded, but commodity codes are allocated to shark products by types as follows:

Exports

fresh or chilled:	0302–65–000
frozen:	0303–75–000
fillets:	0304–29–100
dried fin:	0305–59–920

Imports

fresh/chilled:	0302–65–000
frozen:	0303–75–000
fillets, fresh/chilled:	0304–19–930
fillets, frozen:	0304–99–920
dried fin:	0305–59–090

Under the Law Concerning Standardization and Proper Labeling of Agriculture and Forestry Products (The JAS Law), the indication of the source of fisheries product is mandatory for fresh and frozen products and for some processed products, the name of the country of origin has to be properly labeled on every product if it is imported from abroad or processed with fishery products imported from abroad. However, there is no documentation or labeling laws and schemes to control the source of fisheries products in trade.

Since Japan considered it inappropriate to list the above-mentioned three large shark species (i.e. whale shark, basking shark and white shark) in the CITES appendix II without any scientific justification, it has filed reservations on their listings. Therefore, we do not have any specific arrangement for controlling the trade in those species. However, since there is no fishing activities targeting them and since few numbers of those species have been reported as part of the catch (bycatch), it is not considered that the trade in their products did and would occur.

So far Japan has not faced any problem in controlling and monitoring trade in shark products mainly because of relatively small volume to be traded and low contribution of shark products to overall trade in fishery products. Also, since we do not find any problems in resource abundance of shark species caught by Japanese fishers (directly and incidentally), Japan does not feel it necessary to have stricter control system for trade in shark products. However, in order to further facilitate effective monitoring and control of trade in shark products, the following arrangements are considered appropriate to be introduced in the future, if necessary;

- *Establishment of an organization/association on shark products*.
  In order to systematically monitor the distribution of shark products from production to export, it is considered appropriate to establish an organization and/or association of industries concerned including producers, processors, retailers and exporters (if possible, importers as well). Through the monitoring of shark products distribution, it could become easier to check the volume of trade, to identify shark species to be traded, and to control illegal and unreported trade.

- *Compilation of statistics on domestic distribution and consumption*
  Although it is indispensable to have appropriate statistics on trade in shark products, it is preferable to have at the same time statistics on domestic distribution and consumption of shark products in order to identify shark products illegally imported and/or introduced through IUU fishing.

References

FAO. 2007. Total production 1950–2005. FISHSTAT Plus – Universal software for fishery statistical time series [online or CD-ROM], Fishery Information, Data and Statistical Unit. www.fao.org/fi/statist/FISOFT/FISHPLUS.asp (27/10/2007)

Fisheries Research Agency (ed.). 2002–2007. Report on survey project for highly migratory fish species in the waters around Japan for fiscal year 2001–2006. Japan Fisheries Research Agency, Yokohama.

Statistics and Information Division. Ministry of Agriculture, Forestry and Fisheries. 1986–2003. Annual Reports on Statistics of Fisheries and Aquaculture Production for 1986–2001. Agriculture, Forestry and Fisheries Statistics Association, Tokyo.

Statistics and Information Division, Ministry of Agriculture, Forestry and Fisheries. 2004–2006. Annual Report on Statistics of Fisheries and Aquaculture Production for 2002–2004 (fishery production value). Agriculture, Forestry and Fisheries Statistics Association, Tokyo. (8)+364+(10)pp.

PANAMÁ

Yehudi Nafisa Rodriguez Arriatti
Departamento de Ordenamiento de la Dirección General de Ordenación y Manejo Integral

1. ANTECEDENTES SOBRE LA PESCA DE TIBURONES

La actividad pesquera en Panamá

Desde 1988 se viene explotando intensamente el recurso tiburón en Panamá atendiendo a la demanda del mercado de la aleta. La actividad pesquera se desarrolla en un noventa y cinco por ciento (95%) en las aguas del Océano Pacifico Oriental, encontrándose en sus costas, el 80% de la población del país. Se desconoce a detalle como se están llevando a cabo las pesquerías, cual es el esfuerzo ejercido y la captura realizada, cuantas y cuales son las especies capturadas y descartas, como están siendo controlados los descartes y el nivel de comercialización de los productos derivados del tiburón, y considerando que se carece de un buen registro histórico de las capturas. Es a partir del 2000 (Cuadro 1) que se ha podido colectar información un poco más detallada de los productos comercializados, ya que antes el tiburón entraba en la categoría de "otros" en los desembarques industriales. Anteriormente no se llevaban estadísticas provenientes de la pesca artesanal, proviniendo toda la información de la pesca industrial.

Cuadro 1. Desembarque en toneladas de los diferentes productos derivados del tiburón

Año	Desembarque en toneladas de la pesca industrial, Puerto de Vacamonte				**TOTAL**
	Carne de tiburón	Aleta	Rabo de tiburón	Manta raya	
1981	-	-	-	-	-
1991	-	-	-	-	-
1996	-	-	-	-	-
1997	-	-	-	-	-
1998	-	-	-	-	-
1999	-	-	-	-	-
2000	2 999	124	-	-	**3 123**
2001	3 215	132	-	-	**3 347**
2002	1 960	147	-	-	**2 107**
2003	1 286	98	0,03	-	**1 384**
2004	1 709	500	2	-	**2 211**
2005	2 492	82	3	14	**2 591**
2006	529	74	0,5	12	**616**
2007	25	0,8	-	1	**27**

Registros de no aleteo*	Pesca artesanal (años)		Pesca industrial (años)		Totales provienen de 12 sitios de desembarque
	2007	2008	2007	2008	
	3,27	6,5	3,27	8,41	
* Estos pesos provienen de desembarque de aletas de la actividad de no aleteo, verificado bajo certificado de inspección ocular					

Existen actualmente un total de 710 embarcaciones industriales y 5 900 embarcaciones artesanales. Esta información corresponde a los monitoreos que se toman de tiempo en tiempo en los sitios de desembarques de productos pesqueros y en las comunidades pesqueras. No obstante, los registros de licencias y permisos de pesca, que en algunos casos están inactivos, más las embarcaciones con diversas licencias, más las embarcaciones no declaradas y las embarcaciones con fines de subsistencia, reflejarán una suma mayor. Actualmente, la Autoridad de los Recursos Acuáticos de Panamá (ARAP) mantiene el siguiente registro: 136 permisos de pesca ribereña o artesanal de langosta, 6 438 permisos de pesca ribereña o artesanal de peces, 2 039 permisos de pesca ribereña o artesanal de camarones, 220 licencias de pesca industrial de pargo, mero y tiburón, 104 licencias de pesca industrial de atún, 206 licencias de pesca industrial de dorado, 50 licencias de pesca industrial de doncella y pajarita, 20 licencias de pesca industrial de anchovetas y arenques, 26 licencias de pesca industrial de cojinúa, 229 licencias de pesca industrial de camarones y 191 licencias de pesca en aguas internacionales.

Pesca incidental, dirigida y especies capturadas

Dentro de lo que es la pesca incidental, no existen datos confiables acerca de estas capturas, pero se sabe por ejemplo, que dentro de la flota camaronera (redes de arrastre) un gran número de rayas y tiburones pequeños son víctimas de la pesca incidental. Para la flota palangrera, en cuanto a la captura incidental de especies no-objetivo, hacen falta realizar estudios específicos en conjunto con la flota pesquera.

Actualmente son 16 especies que forman parte de la actividad pesquera, aunque el número puede ser superior debido a que no existe un registro por especie al momento de los desembarques pero, a través de un monitoreo realizado en 1998 por funcionarios de ARAP, se sabe cuales son algunas de las especies capturadas para su comercialización:

Familia Alopidae	
Tiburón Zorro ojón	*Alopias superciliosus*
Tiburón Zorro pelágico	A*lopias pelagicus*
Familia Triakidae	
Musola media luna	*Mustelus lunulatus*
Familia Carcharinidae	
Tiburón Punta Negra	*Carcharinus limbatus*
Tiburón Azul	*Prionace glauca*
Tiburón Oceánico	*Carcharhinus longimanus*
Tiburón Cazón trompa	*Nasolamia velox*
Tiburón Punta Blanca	*Carcharhinus albimarginatus*
Tiburón Toro	*Carcharhinus leucas*
Tiburon Tollo	*Rhizoprionodon longurio*
Tiburón Tigre	*Galeocerdo cuvieri*
Tiburón Mako	*Isurus oxyrinchus*
Familia Sphyrnidae	
Tiburón Cornuda cruz	*Sphyrna zygaena*
Tiburón cornuda común	*Sphyrna lewini*
Tiburón Martillo gigante	*Sphyrna mokarran*
Familia Pristidae	
Pez Sierra	*Pristis pristis*

De la pesca artesanal se tiene que:

Aquellos que trabajan cerca de la costa, capturan individuos pequeños con redes de luz de malla de 3 y 4 pulgadas, mientras que los pescadores que realizan su faena en aguas más profundas utilizan red de enmalle con luz de malla entre 4 1/2", 5", 6", 7" y 8" para capturar especimenes de mayor tamaño.

Existe actualmente, una tendencia por parte de los pescadores artesanales de utilizar el palangre o línea de fondo como arte de pesca principal para la captura de tiburón, mero, pargo y dorado en aguas más profundas, empleando un promedio de 400 anzuelos que varían de tamaño entre los números 7, 8 y 14. El largo promedio de los palangres oscila entre las 600–2 500 brazas de longitud.

De la pesca industrial se tiene que:

Se encuentra integrada por barcos camaroneros, bolicheros, de cojinúa, así como barcos palangreros que se dedican a la pesca del pargo, mero, tiburón, dorado, y barcos de arrastre para la pesca de doncella y pajarita. Utilizan como principal arte de pesca el palangre, el cual puede medir hasta unas 10 millas, empleando entre unos 400 a 2 000 anzuelos por línea. Este número de anzuelos va a depender mucho de la capacidad de la embarcación

Las licencias PMT (pargo, mero y tiburón) no establecen un porcentaje para la captura de tiburón (lo mismo para el pargo y el mero) permitiéndole a la nave que todo su desembarque sea únicamente "tiburón" si se da el caso.

Tanto para la pesca artesanal como en la industrial, ante la ausencia de una buena pesca de peces de escama, algunos pescadores se dedican a la captura de tiburones generalmente durante los últimos meses del año (octubre, noviembre y diciembre), pero de acuerdo a la encuesta realizada por ARAP en 1998, el recurso presenta cierta estacionalidad.

Para el área del Golfo de Panamá el tiburón se presenta de forma masiva entre los meses de junio a octubre y muy cercanos a la costa; en tanto que para el área más occidental del país entre las provincias de Veraguas y Chiriquí la presencia y captura de tiburones se da de manera más abundante durante la temporada seca (enero-marzo). En los meses restantes, los volúmenes de captura son mucho más reducidos y se dan de manera esporádica.

El mercado internacional y el consumo doméstico

La aleta, que es el subproducto con mayor demanda para exportación, se vende como aleta fresca en Chiriquí entre los B/.2.00–15.00 (1 B/. = 1 USD) y como aleta seca entre los B/.5.00–80.00; en Veraguas se comercializan las aletas frescas o congeladas entre los B/.2.00–15.00 dependiendo del tamaño de la aleta. La libra de cartílago de tiburón en polvo está en B/.8.50 y la totalidad del producto está dirigida a la exportación. La piel es otro subproducto que está adquiriendo una gran demanda como rubro de exportación, generando ganancias de hasta B/.750 000 en el 2001 por la empresa New Life Corporation.

La carne de tiburón se vende a B/.1.00 la libra o ligeramente superior a este valor, y se vende como seco-salado, suplantando la importación de bacalao. La carne de raya se vende a un costo de 0.30 centésimos de dólar la libra. De está última no se conoce bien su mercado, pero ya se ha documentado que los excedentes que no son comprados, son desechados, lo que significa que aún no existe una aceptación por parte del mercado local para este producto.

Plan de manejo

Actualmente se encuentra en desarrollo el Plan de Acción Nacional para la Conservación y Ordenación de los Tiburones el cual deberá estar listo para este mes de octubre para que sea sujeto a evaluación. Se ha considerado que, antes de el plan sea aprobado para su ejecución, muchas acciones dentro del mismo ya pueden ser implemientadas, como la busqueda de zonas de crianza, la implementación de guías de identificación de campo como proyecto piloto, toma de datos biológicos-pesqueros (como proyecto piloto) , ubicación de zonas de reproduccción y evaluar la posibilidad de implementar actividades alternativas en algunos los poblados pesqueros como parte de un Plan Maestro de Turismo que se implementará a nivel nacional para el 2009.

2. DISPONIBILIDAD DE DATOS Y SISTEMAS DE SEGUIMIENTO DE LA INDUSTRIA PESQUERA

Actualmente la Autoridad de los Recursos Acuáticos de Panamá (ARAP), es la autoridad competente en cuanto al manejo y ordenamiento de los recursos pesqueros a nivel nacional a partir del 2006. Se está llevando un control de la actividad de no aleteo en los principales sitios de desembarque y se está

sancionando a quien no cumpla la ley o sea sorprendido con aletas de tiburón y no presente el certicado de desembarque avalado por la institución.

La Autoridad Marítima de Panamá se encarga de llevar las estadísticas pesqueras del puerto de Vacamonte, en el cual desembarca toda la pesca proveniente de embarcaciones industriales tanto extranjeras como nacionales, y es aquí donde se descargan los mayores volúmenes de pesca de tiburón.

La Misión Taiwan tiene un programa en conjunto con algunos pescadores regionales que contribuyen en brindar datos acerca de la actividad pesquera artesanal. Actualmente este programa se ha deshabilitado un poco y la información no tiende a ser muy frecuente, creando una perdida de valiosa información. Años atrás, la Autoridad Marítima de Panamá era la encargda de llevar estos registros y ahora toda esta información a pasado a formar parte de la ARAP.

El programa de observadores de la Comisión Interamericana del Atún Tropical (CIAT) brindan datos relacionados con las pesquerias de cerco, proveniendo la misma de barcos extranjeros pero que se abanderan con bandera de Panamá, siendo esta información bastante completa. Datos como el número de tiburones liberados, descartados, retenidos, cercenados (siendo estas dos úpltimas actividades ilegales y ya no permisibles en ningun atunero) son difundidos a través de los Informe de Cumplimiento. Igualmente brindan información por especie, su talla y cuantos fueron los individuos capturados por especie, pero esta información no aparece en el informe de cumplimiento, por lo que se hace necesario buscar la manera de tener el acceso a la misma. También ofrecen dentro de su informe de cumplimiento los barcos que han cometido alguna falta, su país de origen (en este caso, aquellos que posean bandera panameña) y la sanción impuesta.

La WWF lleva desde hace pocos años un programa de observadores a bordo en barcos palangreros, recopilando información de tipo biológico-pesquero, tal como la especie capturada, si la misma fue incidental o dirigida, talla, esfuerzo pesquero, entre otros. Está por firmarse un memorandum de entendimiento entre la WWF y la ARAP, lo que permitirá que toda la información recolectada a través de este programa, sea facilitada a la ARAP para que la misma forme parte de nuestra base de datos a partir del 2009.

A través de MARVIVA, una Organización no Gubernamental (ONG), se ha encargado de divulgar a nivel nacional la importancia de la conservación del recurso tiburón, así como el rechazo de la actividad del “no aleteo”. Su función también implica visitar los campos pesqueros y hacer evaluaciones acerca de la situación actual referente a la pesca de tiburón en los mismos. Actualmente MARVIVA Y ARAP nos encontramos trabajando en conjunto en la implementación de un programa de educación el cual consistirá en visitar los poblados en donde la actividad pesquera se lleve a cabo, sobre todo en aquellas donde el tiburón forme gran parte de sus capturas y evaluar la posibilidad del desarrollo de actividades alternativas (p.e. ecoturismo).

La administración actualmente cuenta con personal capacitado para poder llevar a cabo investigaciones, pero no con el personal suficiente para poder llevarlas a cabo, por lo cual se hace necesario establecer convenios o acuerdos con instituciones nacionales e internacionales de investigación como universidades, el SENACYT, el Smithsonian Tropical Research Institute (STRI) entre otras, que puedan contribuir con el trabajo de investigación. Igualmente, se hace necesario la obtencion de fondos de ONG´s internacionales dedicadas a la conservación.

No existe hasta el momento un ordenamiento para las pesquerías de tiburón a nivel nacional, pero ya se encuentra en rigor la Ley 9 del 16 de marzo del 2006 que prohibe la práctica del aleteo y promueve el uso integral del tiburón de acuerdo a las normativas establecidas en la misma; también se ha suspendido el otorgamiento de nuevas licencias de pargo, mero y tiburón (PMT) y unicamente se están renovando aquellas licencias que no hayan caducado.

La ARAP con el propósito de fomentar la protección y sostenibilidad del recurso tiburón, la Dirección General de Ordenación y Manejo Integral, ha estado capacitando con talleres a cerca de 1 500 pescadores industriales y a casi 13 060 pescadores artesanales, para que se conciencien sobre como debe llevarse a cabo una pesca sostenible y a su vez el aprovechamiento del animal.

En cuanto a la recolección de información de la actividad pesquera, Panamá no cuenta con datos detallados de las capturas (información biologica-pesquera) por lo que adolesemos de un gran atraso en cuanto a la toma de datos de la actividad pesquera en sí, así como información de las especies capturadas. Esto es lamentable para un país como el nuestro que exporta productos derivados del tiburón en cantidades impresionantes, pero ya es notable por parte del sector pesquero artesanal principalmente, que el recurso ha decaido y sus volumenes de captura ya no son como antes. Tampoco se han tomado muestras de tejido, pero este es un trabajo que ya se está considerando ejecutar de manera inmediata, para posteriormente realizar trabajos de investigación para determinar la estructura poblacional de las especies que se encuentran más vulnerables.

Problemática en el seguimiento de las pesquerias

El gobierno no ha considerado la importancia de invertir más fondos para poder aumentar el recurso humano para fines de vigilancia, asì como considerar el poner biólogos en los sitios de desembarque, igualmente en aduna, lo que permitiría tener un mayor control sobre el recurso tiburón al saber cuales son las especies que se están comercializando y vigilar con mayor cuidado el cumplimiento de la ley.

Se han reportado casos de pesca ilegal, inclusive en áreas protegidas y, aunque en estas áreas la vigilancia tiende a ser un poco más frecuente y estricta, no falta el que comete un acto ilícito.

Existen un número significativo de normas que legislan acerca de cómo las pesquerias deberían ser llevadas a cabo, pero lamentablemente existe poca capacidad de coordinación e implementación de las mismas. Aunque debe considerarse que actualmente se le ha tomado un poco más de consideración a la conservación y recuperación de los recursos pesqueros, se hace imprescindible el ejercer más control en la actividad pesquera, ya que la misma es muy dispersa y es muy difícil tener el control sobre 72 sitios de desembarque, aunque este número puede estar muy subestimado.

Con respecto a la información de posee la FAO de los desembarques y la que reposa en nuestros archivos, definivamente existen discrepancias y las mismas se deben más que nada a la carencia y falta de coordinación entre las entidades competentes que se encargan de recopilar esta información. Además, nos encontramos actualmente en un proceso de homogenizacion en cuanto a la captura de datos proveniente de los distintos caladeros y centros de acopio de la información pesquera. También, existen embarcaciones abanderadas panameñas pero que faenan en aguas internacionales y realizan sus descargas en otros países. Estos barcos deberían de suministrar esta información para las estadísticas de contraloria, pero no existe un control sobre ellos.

3. SEGUIMIENTO DEL COMERCIO DE LOS PRODUCTOS DERIVADOS DEL TIBURÓN

El Vice-Ministro de Comercio Exterior (VICOMEX), que es la entidad encargada de regular todo lo relativo a trámites de exportaciones, coordina su actuación respecto a los trámites de exportaciones con un número plural de organismos, incluidos el Ministerio de Desarrollo Agropecuario (MIDA), a través de la Dirección Ejecutiva de Cuarentena Agropecuaria, Sección de Licencias Fitozoosanitarias de Exportación; el Ministerio de Economía y Finanzas, a través de la DGA, Sección de Permisos Aduaneros; y el Ministerio de Salud (MINSA), a través del Departamento de Control de Alimentos.

Para exportar desde Panamá, se debe presentar el formulario de declaración de exportación, la factura comercial firmada, certificado de origen y el registro tributario de la empresa exportadora. Gran parte de las exportaciones no están sujetas a inspección física, salvo algunas excepciones como la aleta de tiburón por parte de la ARAP.

Para la exportación de aletas de tiburón, la Autoridad de los Recursos Acuáticos de Panamá expide una Certificación para la exportación de Aletas de Tiburón, mediante una nota dirigida al Director General de Autoridad de los Recursos Acuáticos de Panamá, con cuatro balboas en timbres. Para la expedición del mismo son requisitos:

- Pre-Declaración de Aduana (Número).
- Certificado de origen expedido por el Vice- Ministro de Comercio Exterior (VICOMEX), que es la entidad encargada de regular todo lo relativo a trámites de exportaciones.
- Tipo de Licencia (Comercial o Industrial).
- Certificados de Desembarque de no Aleteo firmados por inspectores del Departamento de Fiscalización y Zarpe.
- Visto bueno del Jefe del Departamento de Ordenamiento.
- Inspección del Departamento de Ordenamiento para comprobar la existencia del total de libras a exportar.

La Autoridad Panameña de Seguridad de Alimentos, que es la entidad rectora del Estado la cual se encarga de asegurar el cumplimiento y aplicación de las leyes y reglamentos en materia de seguridad de introducción de alimentos al territorio nacional, bajo criterios estrictamente científicos y técnicos. La misma se encarga de emitir los requisitos sanitarios para la importación de Tiburones refrigerados o congelados, para el consumo humano.

Los embarques de tiburón para importación, además de contar con un certificado sanitario, deben contar con una documentación comprobatoria que comprende: copia del formulario de notificación, certificado de origen del producto, copia de factura comercial del producto y una pre-declaración de aduanas.

Sitios de desembarque y comercio de subproductos

Entre los principales sitios de desembarque para la costa Pacífica de Panamá encuentran Mensabé y Búcaro en la Provincia de Los Santos; Puerto Mutis en la Provincia de Veraguas; Farallón en la Provincia de Coclé; San Carlos, Coquira, y Mercado de Mariscos en la Provincia de Panamá; Boca Parita en la Provincia de Herrera y Remedios y Pedregal en la Provincia de Chiriquí. Se llevan registros de la actividad de no aleteo en 12 sitios de desembarque a partir del 2007, siendo estos: Aguadulce, Coquira, El Nance, Juan Díaz, Mensabé, Mercado del Marisco, Mutis, Palo Seco, Pedregal, Playita, Santa Catalina y Vacamonte. De este último

Es a partir del 2007 cuando se inicio la colecta de datos de la actividad de "no aleteo" a través de la expedición de certificados de inspección ocular. Las personas encargadas de entregar los certificados verifican que los tiburones desembarcados tengas todas sus aletas adheridas al cuerpo para el caso de la pesca industrial, o que las aletas correspondan al 5 por ciento del peso del animal (cuando son cercenadas). En este aspecto, existen discrepancias todavía, ya que hacen referencia de este 5 por ciento a tiburones desvicerados y en ocasiones sin cabeza.

El Puerto de Vacamonte es uno de los mayores receptores de desembarques de tiburón, y es aquí donde gran parte de las naves industriales, tanto nacionales como extranjeras (abanderas panameñas) realizan sus descargas, y la Autoridad Marítima de Panamá (AMP) se encarga de llevar las estadisticas al respecto.

El producto que representa una gran demanda para su exportación es la aleta, siendo los principales compradores China, Región Administrativa Especial de Hong Kong (RAE), Japón, Estados Unidos de América, Costa Rica, Reino Unido y México; otros países como Japón, Venezuela, Trinidad y Tabago, Rep. Dominicana, Taiwan Provincia de China, España y Colombia también son consumidores y se exporta entero congelado y como aleta seca.

Las discrepancias entre los datos de la FAO y los registrados para Panamá por parte de nosotros con respecto a las exportaciones, pudiesen radicar principalmente en que la información que llegan a la Contraloria General de la República de Panamá provienen unicamente de aquellos barcos internacionales que llevan este cargamento y hacen el registro de los productos a exportar. Existe el problema en que algunos barcos se niegan a brindar esta información, y también cabe considerar la falta de comunicación con las empresas que se dedican a la exportación de subproductos de tiburón.

Otro gran problema sobre el cual no tenemos un control y que nos impide poder tener un registro adecuado de la captura y comercialización de productos de tiburón es la venta ilegal en aguas internacionales. Barcos que faenan en aguas juridiccionales panameñas venden sus productos a naves que se encuentran en aguas internacionales; también barcos que pescan en aguas juridiccionales panameñas, desembarcan en otros países, y toda esta información se pierde y se desconoce su paradero.

Especies en el apéndice de CITES e identificación de especies

Como parte contratante de la Convención sobre el Comercio Internacional de Especies Amenazadas de Fauna y Flora Silvestres (CITES), Panamá prohíbe las exportaciones de ciertos animales en peligro de extinción de conformidad con la Convención. Lamentablemente en nuestro país no se están identificando las especies desembarcadas, y por tal motivo se desconoce si se están capturando especies bajo algún estatus especial. Pero este es un problema que se pretende solventar antes de que sea puesto en ejecución el Plan de Manejo, ya que esto se hace una medida urgente.

Se desea iniciar con un plan piloto en donde el objetivo principal será lograr que pescadores artesanales, industriales e inspectores de aduana puedan identificar las especies para poder tener un mejor control sobre el recurso. Se está evaluando la posibilidad de realizar un proyecto en conjunto con la Escuela de Biología de la Universidad de Panamá, con el propósito de obtener datos de tipo biológico-pesquero de la pesca artesanal, para poder desarrollar posteriormente proyectos de investigación.

En lo que a vigilancia y control se refiere, la falta de una carencia de recuros para patrullajes de vigilancia es uno de nuestros principales problemas, aunque se podría decir que estos últimos años ha habido un incremento en cuanto a la atención policiaca frente a las denuncias realizadas, en donde muchas veces la misma viene de parte de pescadores o por parte de personas ajenas a la actividad pesquera.

Siendo conscientes de que la vigilancia es una de nuestras principales debilidades, se requiere de la implementación de un programa de inspección y vigilancia en donde participen los inspectores de la Dirección de Inspección, Vigilancia y Control en colaboración con los sectores productivos y en coordinación con otras dependencias de la administración pública y autoridades locales, según las atribuciones que les corresponda.

SÉNÉGAL

Lamine Mbaye
Direction des pêches maritimes
Division gestion et aménagement des pêches

1. INFORMATIONS DE BASE SUR LES PÊCHERIES DE REQUINS

Les principaux types de pêcheries de requins

Au Sénégal le secteur de la pêche est divisé en deux segments:

- un segment artisanal qui est le plus important car il débarque 70 pour cent des captures;
- un segment industriel.

Les requins sont surtout débarqués par le segment artisanal soit par captures directes avec des unités de pêche spécialisées, soit de manière accessoire par divers types d'unités de pêche.

Trois types d'engins existent dans les pêcheries spécialisées de sélaciens: filet maillant dérivant de fond, filet dérivant de fond et palangre.

Le filet maillant dérivant de fond est utilisé à bord des pirogues de 18 à 22 m, avec des marées de 20 jours en moyenne. Les unités sont de type familial, même si, au besoin, les armateurs recrutent des équipages extérieurs à la famille. En général, les propriétaires ne sont pas embarqués. Ce type d'engin aurait été introduit au Sénégal par les Ghanéens à partir de la Casamance au début des années 1980. Ils ont une maille étirée de 240 mm, 20 m de chute et une longueur allant de 40 à 100 m. L'introduction de ces engins s'est accompagnée de l'utilisation d'embarcations de grande taille (18 à 23 m selon les lieux) propulsées par des moteurs de forte puissance (40 à 55 CV). Les caractéristiques de certaines zones de pêche (embouchures de fleuves et zones estuariennes) ont favorisé le passage vers le filet maillant dérivant dans les pêcheries de sélaciens. Cette adoption a été d'autant plus facile que cet engin a été pendant longtemps utilisé dans la pêche au mulet et à l'ethmalose.

Les filets dormants de fonds ont été également introduits à Joal par les ghanéens au début des années 90 pour assurer un ravitaillement correct des ateliers de transformation du requin. Le filet mesure 20 mètres de long (200 mailles) et 1,40 m de chute (7 mailles). Étant un engin de fond, il dispose de peu de flotteurs (7 au maximum) et de lest adéquat pour assurer une flottabilité de l'engin. De type familial, l'unité de pêche embarque 5 à 6 personnes.

Les palangres sont utilisées pour cibler les requins durant une période de l'année (novembre-mai) par quelques unités de pêche basées au port autonome de Dakar. Les unités de pêche industrielles qui utilisent les sennes tournantes, les palangres et les cannes en débarquent de manière accessoire. Les sites de débarquements sont indiqués dans la figure 1 ci-dessous. Les principaux sites se situent dans la partie sud du pays. Il s'agit, par ordre d'importance, d'Elinkine, Diogué, Kafountine, Cap Skiring.

Le nombre de personnes employées dans les pêcheries

En 2007, une étude sur la reconversion des pêcheurs commanditée par le Plan sous-régional d'action de gestion et de conservation des requins a permis d'avoir une idée assez précise du nombre de personnes dépendant directement de la pêcherie.

Cette étude a montré que les unités de pêche spécialisées se situent dans trois sites: Elinkine, Diogué et Cap Skiring, où soixante-treize unités de pêche spécialisées ont été dénombrées. À raison de dix pêcheurs en moyenne à bord de chaque pirogue, il y a donc 730 pêcheurs de requins. Sachant que chaque pêcheur fait travailler en moyenne cinq personnes à terre (porteurs, mareyeurs, transformateurs et autres métiers), on estime à 3 650 emplois créés, auxquels s'ajoutent les emplois induits (restaurateurs, coiffeurs, balayeurs, boutiquiers, etc.). Par ailleurs, il y a un certain nombre de pêcheurs qui capturent des requins accessoirement ou qui les pêchent seulement pendant une certaine période de l'année et ce nombre est difficile à estimer.

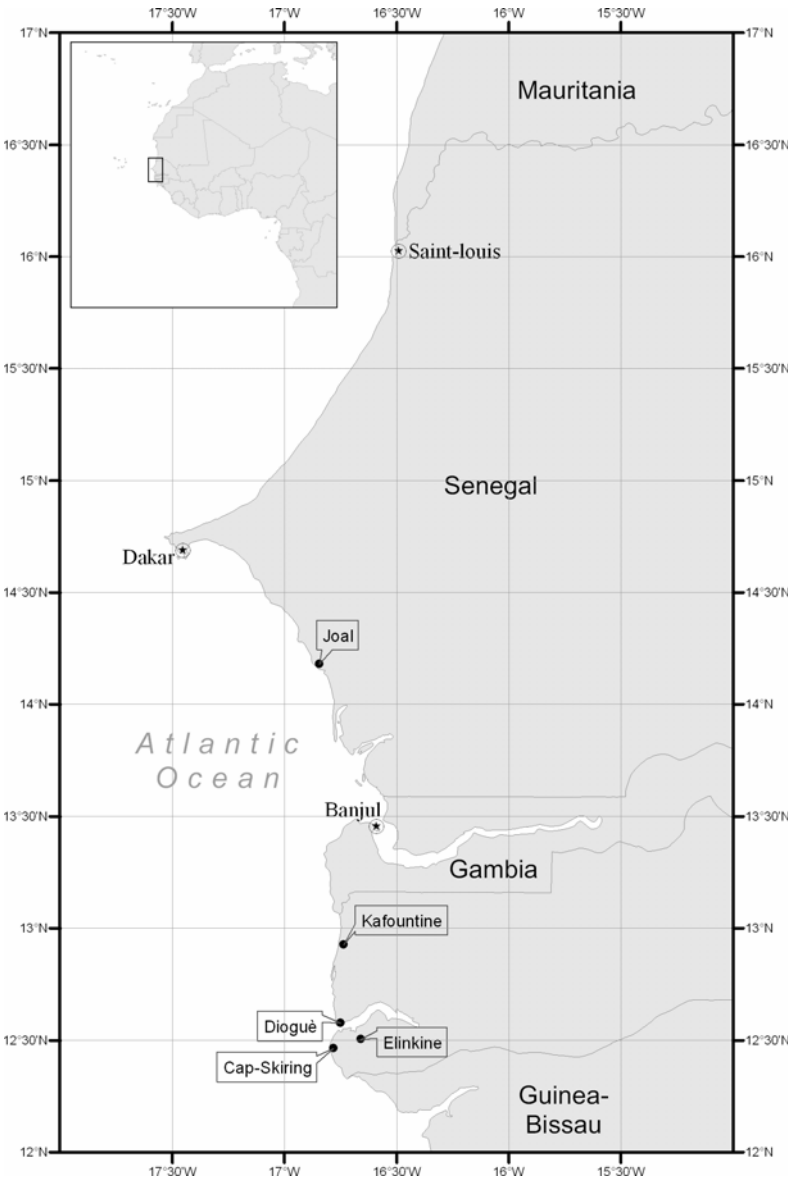

Figure 1: Les principaux sites de débarquements de requins au Sénégal

Les principales espèces qui ont été exploitées et leur statut

Les espèces de requins qui sont pêchées au Sénégal sont indiquées dans le tableau 1.

Tableau 1: Les espèces de requin débarquées au Sénégal

Ordre	Taxon	Nom commun français
1	*Galeocerdo cuvierii*	Requin-tigre commun
2	*Rhizoprionodon acutus*	Requin à museau pointu
3	*Carcharhinus limbatus*	Requin bordé
4	*Carcharhinus carcharhinus*	Requin
5	*Carcharhinus* spp.	Requin
6	*Paragaleus pectoralis*	
7	*Ginglymostoma cirratum*	Requin nourrice
8	*Heptranchias perlo*	
9	*Isurus oxyrinchus*	Requin-taupe
10	*Eugomphodus taurus*	Requin-taureau
11	*Oxynotus centrina*	
12	*Galeus polli*	
13	*Galeus melastomus*	
14	*Scyliorhinus stellaris*	
15	*Sphyrna couardi*	Requin-marteau africain
16	*Sphyrna lewini*	Requin-marteau halicorne
17	*Sphyrna mokarran*	Grand requin-marteau
18	*Sphyrna zygaena*	Requin marteau commun
19	*Squalus blainvillei*	Aiguillat-galludo
20	*Squalus fernandinus*	
21	*Centrophorus granulosus*	Requin chagrin
22	*Centrophorus lusitanicus*	
23	*Lepidorhinus squamosus*	
24	*Centrophorus uyato*	
25	*Centroscymnus crepidater*	
26	*Centroscymnus coleolepis*	
27	*Deania cremouxi*	
28	*Scymnodon obscurus*	
29	*Scymnodon ringens*	
30	*Scymnodon* sp.	
31	*Centroscyllium fabricii*	
32	*Etmopterus pusillus*	
33	*Etmopterus spinax*	
34	*Etmopterus polli*	
35	*Mustelus mustelus*	Émissole lisse

Selon la liste rouge de l'UICN actualisée en 2006, sur les 69 espèces d'élasmobranches recensées dans les captures expérimentales et les statistiques de pêche officielles des pays de la Commission Sous-Régionale des Pêches (CSRP), 14 espèces sont menacées:

Espèces	Statut
Pristis microdon	En danger critique d'extinction
Pristis pectinata	
Rhynchobatus luebberti	
Sphyrna mokarran	
Squatina aculeata	
Squatina oculata	
Squatina squatina	
Rhinobatos cemiculus	En danger
Rhinobatos rhinobatos	
Gymnura altavela	Vulnérables
Leptocharias smithii	
Rhinobatos irvinei	
Sphyrna lewini	
Sphyrna zygaena	

La tendance des captures est présentée dans la figure 2 ci-dessous. Les captures ont augmenté de manière régulière, passant d'environ 4 000 tonnes en 1990 à plus de 10 000 tonnes en 2 000. Après 2 000, une baisse est observée et les captures des dernières années se situent autour de 8 000 tonnes. Cette évolution peut s'expliquer soit par un effort accru de collecte de données ces dernières années, ce qui a eu pour effet de rendre compte de captures plus élevées, soit par une augmentation de la pression de la pêche sur les ressources de requins.

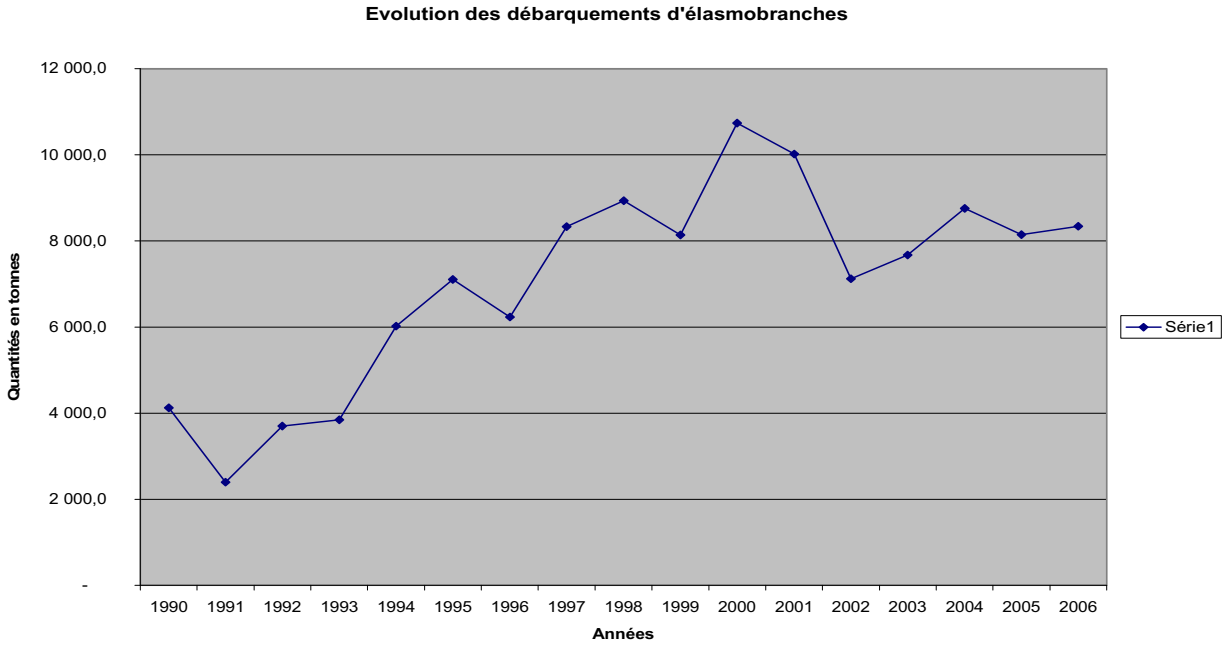

Figure 2: Tendance des captures de requins au Sénégal entre 1990 et 2006 (DPM: Direction des Pêches Maritimes du Sénégal, 2006)

L'importance relative du commerce international et l'utilisation par le pays de requins

Les requins ne sont pas traditionnellement consommés au Sénégal. La quasi-totalité de la production est destinée à l'exportation en particulier vers le Congo, la France, l'Espagne et, dans une moindre mesure, la Grèce. En 2007, 2 100 tonnes de produits issus de requins (ailerons, huile de foie et carcasses) ont été exportées vers ces pays pour une valeur commerciale d'environ 10 millions d'euros.

La situation du développement et de la mise en œuvre du Plan d'action national sur les requins

Le Sénégal a été l'un des premiers pays à élaborer et à adopter un Plan d'action national de gestion et de conservation des requins par l'arrêté ministériel N° 006477 du 25 septembre 2006. Depuis cette date plusieurs actions ont été menées:

- des campagnes de sensibilisation á la situation alarmante des populations de requins auprès des acteurs qui évoluent dans les pêcheries des grands centres de débarquement de requins du pays;
- des sessions de formation des enquêteurs chargés de collecter des données biologiques et socioéconomiques sur la filière requins;
- la production d'un guide d'identification des principales espèces débarquées au Sénégal destiné aux collecteurs de données sur la pêcherie;
- la capitalisation des connaissances sur les pêcheries de requins (synthèse des connaissances biologiques, socioéconomiques, etc., acquises sur cette pêcherie);
- l'étude de la trajectoire des pêcheries de requins dans la sous-région;
- l'introduction du poisson-scie dans la liste des espèces protégées du code de la pêche;
- la médiatisation de la situation alarmante de la pêcherie de requins pour attirer l'attention de l'opinion publique;
- l'identification des indicateurs de suivi de la pêcherie de requins dans l'espace de la CSRP.

2. DONNÉES EXISTANTES SUR LES SYSTÈMES DE SUIVI DES PêCHES

Deux institutions dépendant du Ministère de l'économie maritime sont impliquées dans le système de suivi des pêches: la Direction des pêches maritimes (DPM) est responsable du suivi des pêcheries de requins et la Direction des industries de transformation des pêches (DITP) suit et contrôle les exportations de tous les produits halieutiques dont les requins.

Le Sénégal est membre de la CSRP et en abrite le siège. A ce titre, il participe activement à la mise en œuvre de tous les projets initiés au sein de cette commission. C'est dans ce cadre, qu'il participe à la mise en œuvre du Plan sous-régional d'action de gestion et de conservation des requins (PSRA-requins). Les données qu'utilise le PRSA-requins proviennent de tous les pays membres. En outre, le Sénégal participe à toutes les réunions régionales relatives aux pêcheries de requins comme les sessions de formation sur la biologie des requins, la capitalisation des connaissances biologiques et socioéconomiques acquises sur la pêcherie, l'identification des indicateurs de suivi de la pêcherie de requins au niveau sous-régional.

Grâce à l'appui financier du PSRA-requins, des enquêteurs ont été recrutés dans les principaux centres de débarquement spécialement pour la collecte des données biologiques (taille, poids, sexe, maturité sexuelle, fécondité), socio-économiques (les prix de vente, les quantités, le circuit de distribution, le type d'engin de moteur, la zone de pêche, etc.).

Des fiches d'enquête ont été élaborées et sont remplies à chaque fois que les pirogues débarquent. Les pirogues spécialisées sont toutes enquêtées puisqu'elles ne sont pas nombreuses et qu'elles ne débarquent pas en même temps. Les enquêteurs ont suivi plusieurs formations sur l'identification des espèces de requins et utilisent un guide d'identification des espèces qui a été réalisé par le PSRA-requin.

Les rejets ainsi que les transbordements sont quasi inexistants dans la pêcherie artisanale de requins au Sénégal car l'ensemble des captures est débarqué. Toutefois, il y a parfois des rejets par la pêche industrielle des espèces non ciblées.

Les données collectées dans les centres de débarquement sont envoyées à la Direction des pêches maritimes où elles sont saisies dans une base de données.

L'accès à la pêcherie sénégalaise est libre et les sites de débarquement sont nombreux. Par conséquent, il y a un problème de régulation de l'accès et donc de contrôle de l'effort de pêche qui nécessite des moyens humains, financiers et logistiques de contrôle des pêcheurs. C'est pour cette raison que des enquêteurs ont été recrutés en sus des agents de l'administration.

Le PSRA-requins appuie financièrement le Sénégal pour le recrutement d'enquêteurs supplémentaires. Toutefois, les moyens financiers étant limités, il n'est possible de couvrir qu'une partie des sites de débarquements. Un appui financier, ainsi que des moyens de déplacement seraient nécessaire pour couvrir l'ensemble des sites de débarquements.

Les données transmises à la FAO proviennent de la Direction des pêches maritimes et correspondent aux données disponibles à ce jour.

3. SUIVI DU COMMERCE DES PRODUITS PROVENANT DES REQUINS

La Direction des industries de transformation de la pêche (DITP) est chargée de contrôler les produits avant exportation et délivre, si les conditions sont remplies, un certificat d'origine et de salubrité. Les poins de contrôle, les types de produits, les destinations, les prix et les catégories de produits sont indiqués ci-dessous:

- Les principaux points de contrôle sont l'aéroport, le port et les postes frontaliers.
- Les principaux types de produits commercialisés sont: les ailerons, les carcasses salées séchées, l'huile de requin.
- Les principaux pays importateurs sont: la Chine, Taïwan, Province de Chine, pour les ailerons, l'Afrique centrale et de l'ouest (République démocratique du Congo, Ghana, etc.).
- Les tarifs d'importation des espèces de requins: 100 USD le kilo pour les ailerons, 6 USD le kilo pour les carcasses.
- Il n'y a pas d'indication des espèces commercialisées, seule la catégorie de produits est prise en compte (ailerons, et carcasses salées-séchées).

L'article 28 du décret n°69–132 du 19 février 1969 relatif au contrôle des produits de la pêche indique «Tout produit ayant satisfait aux exigences du contrôle sanitaire prévu dans le présent décret est nanti d'un certificat de contrôle d'origine et de salubrité».

Ce document est exigé pour tous les produits maritimes à l'importation, à l'exportation ou à la circulation à l'intérieur du Sénégal. Il mentionne l'origine des produits, leur nature, la désignation du poisson en langue française ou son nom scientifique, le poids net, le nombre de colis, la date de l'inspection sanitaire, le moyen de transport utilisé, la date d'expédition, la destination. Il est délivré dans les ports, les aéroports ainsi que tous les lieux de débarquement, de production ou de contrôle des produits de la pêche dans les conditions fixées par le titre II du décret.

Les poissons et autres animaux marins à l'importation ne peuvent être livrés à la consommation que munis de ce document sanitaire ou d'un document sanitaire équivalent, non périmé et délivré par des autorités reconnues par le Sénégal.

Il est établi en quatre exemplaires conformément au modèle en annexe. L'original du document sanitaire accompagne le produit pour l'exportation; il constitue le seul document légal permettant au service de douane d'établir des documents de connaissement. Les autres exemplaires sont communiqués à la Direction du commerce, au service de la statistique et à la direction des pêches Maritimes.

Les espèces *Rhincodon typus*, *Cetorhinus maximus*, et *Carcharodon carcharias* ne sont pratiquement pas débarquées au Sénégal et ne sont pas importées. Le problème de contrôle et de suivi du commerce de ces espèces ne se pose donc pas.

L'amélioration du suivi du commerce des produits provenant des requins nécessite des actions à l'échelle sous régionale. En effet, les frontières étant poreuses et les acteurs de la filière mobiles, la concertation entre pays de la sous-région est essentielle pour la mise en place un système de contrôle concerté. Les recommandations suivantes sont proposées:

- L'identification des espèces commercialisées nécessiterait la mise en place d'un système de traçabilité du produit depuis la capture jusqu'à la consommation.

- Le commerce illicite et non reporté pourrait être évité si un système de contrôle d'amont en aval de la filière était mis en place. Aussi, un effort de sensibilisation de tous les acteurs de la filière devrait être fait.
- Les officiers de douane devraient être équipés et formés afin d'améliorer leurs conditions de travail et la qualité de leurs résultats.

Appendice IV de l'annexe VI (Français)

MODÈLE DE CERTIFICAT SANITAIRE POUR L'IMPORTATION DE PRODUITS DE LA PÊCHE DESTINÉS À LA CONSOMMATION HUMAINE

Pays : SENEGAL **Certificat vétérinaire vers l'UE**

Partie I : Renseignements concernant le lot expédié

1.1 Expéditeur

Nom……

Adresse……..

Code postal

Tél.

1.2 N° de référence du certificat *1.2.a.*

1.3 Autorité centrale compétente : ***Ministère de l'Economie Maritime et des Transports Maritimes-Direction des Industries de Transformation de la Pêche-Division des Inspections et du Contrôle (MEMTM-DITP-DIC)***

1.4 Autorité locale compétente _____

1.5 Destinataire

Nom……..

Adresse……..

Code postal

Tél.

1.6.

1.7 Pays d'origine	*Code ISO*	*1.8 Région d'origine*	*Code*	*1.9 Pays de destination*	*Code ISO*	*1.10.*
SENEGAL	***SN***	_____	___	***FRANCE***	***FR***	

1.11 Lieu d'origine

Nom…….....Numéro d'agrément….. ..……..

Adresse……

1.12.

1.13 Lieu de chargement ***DAKAR***

1.14 Date du départ ……..

1.15 Moyens de transport

Avion ☐ *Navire* [x] *Wagon* ☐

Véhicule routier ☐ *Autres* ☐

Identification : ……...

Référence documentaire :BL N°……..

1.16 PIF d'entrée dans l'UE……..

1.17.

1.18 Description marchandise : ***Produits de la pêche.***

1.19 Code marchandise (code SH)

1.20 Quantité

1.21 Température produit

Ambiante ☐ *Réfrigérée* ☐ *Congelé* [x]

1.22 Nombre de conditionnement

1.23 N° des scellés…….....

N° des conteneurs……

1.24 Type de conditionnement

1.25 Marchandises certifiées aux fins de :

Consommation humaine [x]

1.26.

1.27 Pour importation ~~ou admission~~ dans l'UE [x]

1.28 Identification des marchandises

Numéro d'agrément des établissements

Espèce (Nom scientifique))	Nature du produit	*Type de traitement*	*atelier de fabrication*	Nombre de conditionnement	*Poids net*

(voir verso)

N° de référence du certificat :

Espèce (Nom scientifique)	Nombre de conditionnement	*Poids net* **118**	*Atelier de fabrication*	Nature du produit	*Type de traitement*
				ORIGINE SAUVAGE	**CONGELE**
Total			———	———	———

PAYS : SENEGAL **Produits de la pêche**

Partie II : Certification

II. Attestation sanitaire

I.a Numéro de référence du certificat	II.b

II.1. Attestation de santé publique

Je soussigné déclare avoir connaissance des dispositions pertinentes des règlements (CE) n° 178/2002, (CE) n° 852/2004, (CE) n° 853/2004 et (CE) n° 854/2004 et certifie que les produits de la pêche susmentionnés ont été produits conformément auxdites dispositions, et notamment :

- qu'ils proviennent d'un/d'établissement (s) appliquant un programme fondé sur les principes HACCP, conformément au règlement (CE) n° 852/2004,
- qu'ils ont été capturés et manipulés à bord des navires, débarqués, manipulés, et le cas échéant, préparés, transformés, congelés et décongelés de façon hygiénique dans le respect des exigences de l'annexe III, section VIII, chapitres I et IV, du règlement (CE) n° 853/2004,
- qu'ils sont conformes aux normes sanitaires de l'annexe III, section VIII, chapitre V, du règlement (CE) n° 853/2004 et aux critères du règlement (CE) n° 2073/2005 concernant les critères microbiologiques applicables aux denrées,
- qu'ils ont été emballés, entreposés et transportés conformément à l'annexe III, section VIII, chapitres VI à VIII, du règlement (CE) n° 853/2004,
- qu'ils ont été marqués conformément à l'annexe III, section I, du règlement (CE) n° 853/2004,
- que les garanties couvrant les animaux vivants et les produits qui en sont dérivés, s'ils sont issus de l'aquaculture, prévues par les plans relatifs aux résidus présentés conformément à la directive 96/23/CE, et notamment à son article 29, sont réunies,

et

- qu'ils ont subi de manière satisfaisante les contrôles officiels prévus à l'annexe III du règlement (CE) n° 854/2004.

II.2. ([1]) Attestation de santé animale pour les produits issus de l'aquaculture

Je soussigné déclare que les produits de la pêche susmentionnés proviennent de poissons ou de crustacés cliniquement sains le jour de leur récolte et qu'ils ont été transportés dans des conditions n'ayant aucune incidence sur leur statut sanitaire, et notamment que:

- ([1]) ([2]) si les produits sont d'une espèce sensible ([3]) à l'AIS et/ou à la NHE, ils :
  - ([1]) [proviennent d'une source ([4]) considérée comme indemne d'AIS ou de NHE conformément à la législation de l'UE ou norme de l'OIE applicable ([1])]
  - ([1]) [ont été mis à mort et éviscérés]]
- ([1]) ([6]) si les produits sont d'une espèce sensible ([3]) à l'SHV et/ou à la NHI, ils :
  - ([1]) proviennent d'une source ([4]) considérée comme indemne de ([1])SHV/([1])NHI conformément à la législation de l'UE ou norme de l'OIE applicable ([5])],
  - ([1]) [ont été mis à mort et éviscérés]]]

N° de référence du certificat :

Notes

Partie I :

- Rubrique1.8 : région d'origine : pour les produits issus de l'aquaculture, indiquer, s'il y a lieu, les zones figurant sur les listes établies par les décisions 2002/308/CE et 2003/634/CE de la commission. Pour les mollusques bivalves congelés ou transformés, indiquer la zone de production.
- Rubrique 1.11 : lieu d'origine : nom et adresse de l'établissement d'expédition.
- Rubrique 1.15 : numéro d'immatriculation (wagon ou conteneur et camion), numéro de vol (avion) ou nom (navire). Des informations distinctes doivent être fournies en cas de déchargement et de rechargement.
- Rubrique 1.19 : utiliser les codes SH appropriés : 03.01, 03.02, 03.03, 03.04, 03.05, 03.06, 03.07, 05.11.91, 15.04, 15.18.00, 16.03, 16.04, 16.05.
- Rubrique 1.23 : n° des scelles et n° des conteneurs : uniquement lorsque la réglementation l'exige.
- Rubrique 1.28 : nature de la marchandise : préciser s'il s'agit de produits issus de l'aquaculture ou d'origine sauvage. Type de traitement : produits vivants, réfrigérés, congelés, transformés. Atelier de fabrication : y compris les navires-usines, les navires-congélateurs, les entreprises frigorifiques, les établissements de transformation.

Partie II :

- La partie II.2. ne s'applique pas aux lots destinés à la vente au détail, à condition qu'ils soient conformes aux règles d'emballage et d'étiquetage fixés par le règlement (CE) n° 853/2004.

([1]) Biffer les mentions inutiles.

([2]) Cette partie du certificat de santé animale s'applique uniquement si le lot comprend des espèces considérées comme sensibles à l'AIS et/ou à la NHE. Cette disposition concerne les exportations à destination de tous les Etats membres ; il convient de conserver l'une des deux déclarations, sauf si le lot est destiné à une transformation supplémentaire dans un centre d'importation agréé.

([3]) espèces sensibles connues :

Maladie	Espèces hôtes sensibles
NHE	Perche commune (Perca fluviatilis), truite arc-en-ciel (Oncorhynchus mykiss).
AIS	Saumon atlantique (Salmo salar), truite arc-en-ciel (Oncorhynchus mykiss), truite brune (Salmo trutta).
SHV	Morue (Gadus morhua), hareng (Clupea harengus), truite brune (Salmo trutta), saumon chinook (oncorhynchus tshawytscha), saumon coho (O. kisutch), ombre commun (Thymallus thymallus), églefin (Melanogrammus aeglefinus), morue du Pacifique (Gadus macrocephalus), hareng du pacifiue (Clupea harengus pallasi), brochet (Esox lucius), truite arc-en-ciel (Oncorhynchus mykiss), loche de mer (rhinonemus cimbrius), sprat (Sprattus sprattus), turbot (Scophthalmus maximus), corégones (Coregonus sp.).
NHI	Truite arc-en-ciel (Oncorhynchus mykiss), espèces de saumon du Pacifique [saumon chinook (O tshawytscha)], saumon rouge (O. nerka), saumon keta (O. keta), saumon masou (O. masou), saumon rose (O. rhodurus) et saumon coho (O. kisutch), et saumon atlantique (Salmo salar).

([4]) la source peut être un pays, une zone ou une exploitation.

([5]) « Indemne » au sens des dispositions de l'annexe B ou C de la directive 91/67/CEE et des décisions 2001/183/Ce et 2003/466/CE de la Commission. L'absence de maladie au sens de l'édition la plus récente du code et du manuel de l'OIE est également reconnue.

([6]) cette partie du certificat de santé animale s'applique uniquement si le lot comprend des espèces considérées comme sensibles à la SHV et/ou à la NHI. Pour que soit autorisée l'entrée du lot dans un Etat membre ou une partie d'Etat (rubriques 1.9 et 1.10 de la partie I du certificat) déclarée indemne de SHV et/ou de NHI, ou faisant l'objet d'un programme visant à devenir indemne de ces maladies, il faut conserver l'une des deux déclarations, sauf si le lot est destiné à une transformation supplémentaire dans un centre d'importation agréé.

([6]) Une liste des Etats membres et zones en question figure dans les décisions 2002/308/CE et 2003/634/CE de la commission.

- couleur du cachet et de la signature doit être différente de celle des mentions du certificat.

Date.....

Cachet officiel | Signature de l'inspecteur officiel | Nom (en majuscule), titre et qualité

BALEARIC ISLANDS, SPAIN

G. Morey
Dirección General de Pesca
Government of Balearic Islands

1. BACKGROUND INFORMATION ABOUT THE SHARK FISHERIES

This report focuses on the elasmobranch fisheries of the Balearic Islands of Spain. Annex I of the report provides a brief overview of the elasmobranch catches for the whole Spanish fleet.

Most of the elasmobranchs captured off the Balearic Islands (Balearic Islands) are a bycatch product. Only a few directed fisheries exist for the seasonal capture of smooth hounds *Mustelus* spp. (both with trammel nets and bottom longline) and of skates (this one very locally, with trammel net).

The rest of the catches are originated mainly from bottom trawling mainly, both on the insular shelf and the slope, usually down to approximately. 600 meters, reaching sometimes areas of about. 800 meters depth. This type of gear accounts for more than 80 percent of the total elasmobranch capture in the Balearic Islands.

The rest of the fishing fleet in the Balearic Islands is composed of very few (n=5) pelagic longline boats in Mallorca Island, some of them inactive at present; ten purse seiners, that contributes 0,05 percent of the elasmobranch capture in the Balearic Islands, and about 350 small-scale fishing boats that uses a variety of gears as trammel nets targeting for littoral fish species and cuttlefish, gill-nets targeting for red mullet (*Mullus surmuletus*) or spiny lobster (*Palinurus elephas*) and bottom longline targeting mainly dusky grouper (*Epinephelus marginatus*) and species of the Family Sparidae. All these fisheries are carried out over the insular shelf.

The official statistics of the number of people involved in the fishery are not accurate and do not represent the real number of fishers currently working at sea. Based on our own experience, and on the number of fishing vessels included in every category, the number of active fishers in the Balearic Islands is approximately 696, distributed among fisheries as described in Table 1.

Table 1: Number of fishing vessels and number of active fishers in each fishery of the Balearic Islands

	Small-scale	**bottom trawling**	**Purse seine**	**Bottom longline**	**Pelagic longline**	**TOTAL**
No. vessels	338	54	10	10	5	418
No. fishermen	453	192	24	15	12	696

Table 2 shows the commercial value (first sell at the central fish auction wharfs) for the total catch in the Balearic Islands from 2002–2006, as well as for the elasmobranchs and their relative importance in relation to the total catches. The mean values for elamobranchs during this period was 574.500 €/year, representing 2,83 percent of the total commercial value of the Balearic Islands fisheries.

Table 2: Commercial value of elamosbranch catches in relation to the total catches in the Balearic Islands.

Year	Elasmobranchs		Total catch
2002	Value (€ x 1000) per cent	504.7 2.8	17 719.6
2003	Value (€ x 1000) per cent	517.8 2.9	17 828.3
2004	Value (€ x 1000) per cent	631.3 3.0	21 008.9
2005	Value (€ x 1000) per cent	582.6 2.7	21 967.3
2006	Value (€ x 1000) per cent	636.0 2.8	23 008.1

Table 3 shows the values of the gross domestic product (GDP) in the Balearic Islands for the period 2002–2006, and the contribution of the Balearic Islands fisheries (regarding both the total catch and the elasmobranchs only) to this GDP.

Table 3: Contribution of fisheries to the GDP of the Balearic Islands

Year	PIB Balearic Islands (000 €)	Contribution to GDP (%)	
		Elasmobranchs	TOTAL capture
2002	17 2269.7	0.003	0.103
2003	–	–	–
2004	20 900	0.003	0.101
2005	22 618.2	0.003	0.097
2006	24 200.5	0.003	0.095

Table 4 shows the catch volumes for the main species of elasmobranchs caught in the Balearic Islands between 1996 and 2006. Trends in landed biomass have been analysed for some elasmobranch species, although the error in their identification when labelled would result in biased estimations. Thus, in situ monitoring of marketed sharks should be conducted for estimating this bias.

Table 4: Elasmobranchs landings (tonnes) reported in the Balearic Islands between 1996 and 2006 (Source: Fisheries Department – Balearic Islands Government)

Name	Scientific name	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Catshark	*Scyliorhinus* spp.	56.7	61.4	56.1	53.6	53.6	28.4	123.6	108.4	120.0	93.5	88.0
Blackmouth catshark	*Galeus melastomus*	5.6	6.3	6.5	8.3	3.7	3.5	13.5	21.4	26.1	13.4	10.4
Smooth hound	*Mustelus* spp.	5.0	7.3	6.2	4.7	3.9	1.4	6.4	6.2	4.0	3.9	3.7
Longnose spurdog	*Squalus blainvillei*	1.9	6.6	1.5	0.5	0.6	0.4	0.6	0.7	2.7	3.0	2.5
Gulper shark	*Centrophorus granulosus*	2.7	1.7	1.4	1.2	1.6	0.3	0.9	0.7	2.0	1.9	1.4
Small shark	"TOLLOS"	0	0	0.6	0.4	6.4	0.4	0.7	3.4	2.5	3.6	6.6
Bluntnose sixgill shark	*Hexanchus griseus*	2.0	5.7	6.3	7.8		1.8	9.8	10.2	5.0	3.9	4.8
Blue shark	*Prionace glauca*	1.7	1.2	0.3	0.1	0.4	0.0	2.1	2.3	1.1	2.7	2.0
Tope shark	*Galeorhinus galeus*	0	0	0	0	0	0	0.0	0.4	0.7	0.4	0.3
Lamnidae	*Lamnidae*	0	0	0	0.0	0	0.0	0.0	0.1	0.2	0.1	0.1
Large shark	SHARK	3.9	0.3	0.4	0	0	0	0	0	0	0	0
Batoidae	Rays & skates	88.6	88.8	86.7	67.9	64.6	28.8	110.4	100.5	115.8	104.9	123.4
Elasmobranchs (not specified)	"BASTINA"	76.0	77.5	67.1	0	0	0	0	0	0	0	0
	TOTAL	244.1	256.7	233.1	144.6	135.3	65.2	268.1	254.4	280.4	231.5	243.2

Notes to Table 4:

- Catsharks: this category includes both species of catsharks occurring off the Balearic Islands: the smallspotted catshark *Scyliorhinus canicula* and the nursehound *S. stellaris*, despite the latter is only occasionally captured, and its contribution to the total amount could be considered as negligible.
- Smooth hounds: Pending on accurate identification of some specimens that could be in fact *Mustelus punctulatus*, the vast majority of the captured specimens are *M. mustelus*.
- Small sharks ("Tollos"): this category, under the Spanish name "tollos" includes a variety of small demersal sharks of low commercial value that, despite being landed, very often are not sold. Species as *Dalatias licha* (mainly) *Etmopterus spinax*, or *Oxynotus centrina* are fall into this category.

- Bluntnose sixgill shark (*Hexanchus griseus*): in the official landing statistics this species appears under the category "Peregrino", which is the Spanish name for the basking shark *Cetorhinus maximus*. This issue has been corrected for this document. Nevertheless, the only reported capture (and marketing) of a true basking shark in the Balearic Islands for the period 1996–2006 occurred in 2001, when a ca. 7 m specimen was captured in a trap net. The figures corresponding to this individual were joined to those corresponding to *H. griseus* under the category "Peregrino".
- *Lamna nasus*, very likely the values correspond to the shortfin mako *Isurus oxyrinchus*.
- Large sharks: probably this category includes some lamnid sharks, as well as sharks of the genus *Carcharhinus*, and the common thresher *Alopias vulpinus*.
- Batoidea: Only very large stingrays are marketed, the rest being discarded at sea. For the values included herein, the vast majority of the capture should be considered as belonging to the family Rajidae.
- "Bastina": this is the Catalan name for the elasmobranchs. This category appears in the data because the low level of accuracy when reporting the landings for some ports and for some years.

The Balearic fleet provides fish and sea products for local consumption. Any possible exportation to extra-balearic markets should be considered as negligible. Nevertheless, pelagic longliners operating around the Balearic Islands seldom land their capture in Balearic Islands ports, but in their base ports. For this reason, although most of the pelagic sharks reported in the Balearic Islands official landing statistics belong to non-Balearic Islands pelagic longliners, it has to be taken into account that a very large portion of their capture are landed at ports located in the eastern and southeastern coast of Spain and, therefore, reported elsewhere.

A National Plan of Action of Sharks has not been implemented in Spain. It is pending on the elaboration of the European Union-International Plan of Action-Sharks.

2. DATA AVAILABILITY AND FISHERY MONITORING SYSTEMS

There is no specific monitoring program for the shark fisheries in the Balearic Islands. The only institution that regularly carries out monitoring surveys (both on commercial and experimental vessels) is the Spanish Institute of Oceanography (IEO). Surveys are mainly bottom trawling. Nevertheless, as a result of some surveys carried out by the Fisheries Department of the Balearic Islands Government, data on distribution, abundance and occurrence of elasmobranchs in littoral fisheries have been collected since 2000.

Data on the landings are compiled by the organization responsible for the commercialization of the fish and sea products in the Balearic Islands. These data are subsequently provided to the Fisheries Department (Balearic Islands Regional Government), which in turn provides them to the Fisheries Ministry (Spanish Government).

In the Balearic Islands, data on fish and other sea products are provided to the Fisheries Department by the organization responsible for the commercialization (first sale) of these products. These data are detailed daily by species, biomass landed, prize, and for each fishing vessel. Therefore, data can be analysed in whatever level of accuracy required, since every vessel has been previously identified regarding its own type of fishery (small-scale, purse seine, pelagic longline, bottom trawl). Nevertheless, some limitations exist, the most important being those coming from the discarded capture, that are not reported, and from the pooling of several species into a commercial category.

In relation to discards, some few scientific papers have been produced to evaluate this issue. For Balearic Islands waters, an article was published in 2003 on the bycatch of the two of the most important species (*Galeus melastomus* and *Etmopterus spinax*) in the bottom trawling fishery (Carbonell *et al.*, 2003).

Concerning the correct identification of the species landed, the Balearic Islands Fisheries Department is developing a project for monitoring this issue. This includes regular visits to the central fish auction wharf for reporting the species being sold and their proper identification, and comparison with the statistics provided by the organization responsible of the fish commercialization.

At present, species are identified, when landed at every fishing port, by non-specialized staff, that often reports some several species into a same commercial category (see Table 4 and notes to this table). Field

guides are not being used by fishermen or port staff to properly identify species. Only a few researchers have been trained to correctly identify shark and ray species. As recognized in several documents, this is a key factor for a proper monitoring of shark fisheries.

Abundance, biomass and catch per unit of effort (Cpue) of elasmobranchs have been analysed from several fishery-dependent and fishery-independent surveys carried out within several MPAs existing in the Balearic Islands (e.g. Morey *et al*., 2006). Also, the distribution patterns and indices of abundance were obtained from some bottom trawl surveys on the Balearic Islands shelf and slope (Massutí and Moranta, 2003). Nevertheless, a special emphasis should be stressed on better determining these indices in the next future.

Despite the quantity of scientific surveys and scientific monitoring on board fishing vessels, there exists a lack of detailed information on shark fisheries and/or biology. Only a few researchers in Spain have published articles on these issues, but no regular programs or lines of research have been implemented. Sporadic or anecdotal information is available through International Commission for the Conservation of Atlantic Tunas (ICCAT) scientific papers regarding pelagic fisheries.

Information for the Balearic Islands on pelagic longliners is very scarce and fragmentary, due to only five vessel are licensed to make use of this gear, and most of the sharks (and teleosts as well) captured off the Balearic Islands are landed at ports located in the Spanish mainland and thus they are not reported in the Balearic Islands statistics.

Regarding illegal, unreported and unregulated (IUU) fishing, overall only the unreported component could be considered as non-negligible in the Balearic Islands. This unreported fishing means that a minor part of the capture is sometimes sold directly to some particular consumers or restaurants. But in the case of sharks, it should be considered as negligible (if indeed existing).

3. MONITORING OF TRADE IN SHARK PRODUCTS

International trade does not exist for Balearic Islands shark fisheries. Only recently, in Formentera Island an artisanal industry has developed for the commercialization of canned dried skates and rays, which is a traditional product there. However, the magnitude of this trade is not known for the moment. Overall, sharks are marketed as a fresh product in the local markets.

The level of identification is different for each species in trade. The following list includes comments on this issue for the species regularly or occasionally present at the central fish auction wharf:

- *Hexanchus griseus*: labeled as “Peregrino” (=basking shark, *C. maximus*), but because the true basking sharks were reported only once at the fish auction wharf (2001), statistics for *H. griseus* can be easily separated from the total.
- *Squalus* spp.: correctly identified under the Balearic common name “Quissona”.
- *Centrophorus granulosus*: correctly identified under the Balearic common names “ullàs” or “ullot”.
- *Dalatias licha*: Not correctly identified, it can labelled as both “negret” or “tollo”, a name commonly used for deep-sea sharks of low commercial value.
- *Alopias vulpinus*: Not correctly identified, it can labelled as both “tauró” (=shark) or as Lamnidae.
- *Isurus oxyrinchus*: Not correctly identified, it can labelled as both “tauró” (=shark) or as Lamnidae.
- *Galeus melastomus*: correctly identified under the Balearic common name “moixina”.
- *Scyliorhinus canicula*: correctly identified under the Balearic common name “gató”.
- *Scyliorhinus stellaris:* Not correctly identified, it is labelled as *S. canicula*.
- *Galeorhinus galeus*: Despite the existence of the category “Cassó” (=*G. galeus*) at the statistics, this species is very often confused with smooth hounds *Mustelus* spp. and labelled as Mustelus. The category “Cassó” is of a very low reliability.
- *Mustelus mustelus (*and possibly *M. punctulatus*): correctly identified to genus level under the Balearic common name “mussoles” for this genus.
- *Carcharhinus* spp.: Very few specimens recorded, they are likely to be reported as “tauró” (=shark).
- *Prionace glauca:* correctly identified under the Balearic common name “tintorera”.

All batoid elasmobranchs are reported as “rajada”, which is the local name for species of Rajidae. Therefore, it is impossible to carry out any analysis at species level for this group. Nevertheless, the vast majority of the marketed batoids are indeed Rajidae, stingrays being a minor portion of the landed biomass.

Fish marketed in Spain must show its own identification card to consumers at sale points. This includes the fishing area (FAO codes), common name and scientific name (not always correct), source (captured at sea or from aquaculture), presentation to consumers (including whether the fish is presented fresh or frozen, headless, gutted, filleting). In the Balearic Islands, additional information is presented regarding the name of the fishing vessel and its port.

Of the shark species listed in CITES Appendices, only the white shark *C. carcharias* and the basking shark *C. maximus* have been reported in the Balearic Islands. The last reported capture of *C. carcharias* dates from 1976. During the 1996–2006 period, only three captures of the basking shark have been recorded in the Balearic Islands. Two of them were discarded at the sea, and only one was marketed. Some additional captures were reported in the Spanish Levantine coasts (Catalonia and Valencia), where captures of basking sharks seem to be more frequent. These individuals are commonly landed, although no information about their commercialization was available to the author.

Improving the monitoring of trade in shark products

As mentioned before, the lack of trained specialists for monitoring shark fisheries (both onboard and at landing sites) has been identified as one the main key issues for solving the incorrect identification of elasmobranches in catches and trade.

The implementation of specific programs for shark fisheries and shark biology programs should include trained specialists for monitoring fisheries onboard and landing sites as well.

Annex I

Sharks landings in Spain

The Spanish fishing grounds ("caladero nacional", within the EEZ until 200 miles off Spanish coasts) are divided into four areas:

a) Cantabrian Sea and NE-Atlantic: the fishing fleet from Galicia region (NW Spain) comprises approximately 50% of the Spanish fleet in number of vessels and 40% in tonnage. The rest of the Cantabrian fleet (North Spanish coast) constitutes 6% of the fishing vessels and 20% of the vessels tonnage.
b) Gulf of Cadiz: representing 10 percent of the total Spanish fleet in terms of both number of vessels and tonnage.
c) Canary Islands: Less than 4 percent in number of vessels and tonnage.
d) Mediterranean Sea: 30 percent of the Spanish fishing fleet in number of vessels and tonnage.

The Spanish fishing fleet differs among areas, especially in terms of fishing gears and fishing tactics. An important fleet that operates in international waters exist in NW Spain. The most important species reported in Spanish landings is the blue shark *Prionace glauca* (see Tables A1, A2 and A3), captured by the drifting longline fishery from NW coasts mainly, and also by drifting longliners from Andalusia (southern Spain region, at both sides of the Straits of Gibraltar).

The second important taxa in Spanish landings are the Batoids (no species-specific data exist). Batoids are the single most important taxa in shark landings in the Balearic Islands (46 percent of sharks landed biomass). The Balearic Islands fleet could be interpreted as representative of the Spanish Mediterranean fleet which is mainly composed by bottom trawlers in terms of vessels tonnage and fishing capacity/effort.

The understanding of the relative contribution from each area's fishing fleet to the whole shark capture (and at species level as well) in Spain is a goal to be achieved in the very next future.

An overview of shark fisheries in Spain is described below (Source: Fisheries Ministry):

– Directed fisheries:
1. Pelagic long line fishery: up to 275 vessels mainly targeting swordfish *Xiphias gladius*, shortfin mako *Isurus oxyrinchus* and blue shark *Prionace glauca*.
2. 5–6 bottom longliners targeting deep-water sharks in international waters.
3. Trawlers in NAFO area fishing for rays. 15–18 vessels.

– Bycatch fisheries:
1. About 210 bottom trawlers and bottom longliners fishing in European waters that capture some deep-water sharks and rays.
2. Bottom trawlers in coastal areas of Spain that catch rays and demersal sharks.

Table A1: Elasmobranch landings (tonnes) from the drifting pelagic longline fleet reported in Spain between 2002 and 2007 (Source: Ministerio de Medio Ambiente, Medio Rural y Marino)

Pelagic longliners	**Landed biomass (tonnes)**							
Species	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**Mean**	**%**
Prionace glauca	25 238.9	27 111.7	31 271.0	32 225.4	35 884.0	38 325.9	31 676.1	80.4
Carcharhinus & mackerel sharks	7 496.0	3 916.1	4 322.8	4 334.3	3 930.4	27 25.3	4 454.1	11.3
Isurus oxyrinchus	344.2	793.1	1 010.5	1 513.9	2 003.0	2173.9	1 306.4	3.3
Sharks not specified	684.3	664.8	506.0	591.9	391.0	249.4	514.6	1.3
Lamna nasus	792.4	609.4	513.7	387.9	357.6	296.0	492.8	1.3
Sphyrna lewini	323.0	180.5	287.0	203.9	32.6	18.9	174.3	0.4
Rest of sharks	368.1	563.2	589.7	872.3	894.9	1380.8	778.2	2.0
Total	35 246.8	33 838.7	38 500.7	40 129.6	43 493.5	45 170.2	39 396.6	-

Table A2: Elasmobranch landings (tonnes) from the bottom longline fleet reported in Spain between 2002 and 2007 (Source: Ministerio de Medio Ambiente, Medio Rural y Marino)

Bottom longliners	**Landed biomass (tonnes)**							
Species	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**Mean**	**%**
Squalus acanthias	70.4	50.4	25.5	341.7	722.5	2 672.2	647.1	35.6
Centrophorus granulosus	409.3	510.1	301.7	137.7	12.2	1.2	228.7	12.6
Prionace glauca	256.6	161.9	225.7	57.4	169.6	197.7	178.2	9.8
Fam. Squalidae	34.5	86.6	735.5	8.6	2.8	1.7	144.9	8.0
Gen. Carcharhinus & macherels sharks	86.7	20.8	56.8	25.2	384.5	7.8	97.0	5.3
Galeorhinus galeus	76.3	147.6	122.2	40.3	42.3	43.8	78.8	4.3
Batoidea	70.6	70.8	95.1	71.8	74.9	52.1	72.5	4.0
Centroscymnus coelolepis	0	0	23.2	131.3	175.1	35.2	91.2	5.0
Batoidea	78.2	76.5	68.1	56.5	32.5	51.1	60.5	3.3
Sharks not specified	25.7	20.5	150.2	70.5	8.1	69.3	57.4	3.2
Fam. Scyliorhinidae	155.5	34.7	62.9	47.7	32.8	4.6	56.4	3.1
Rest of sharks	61.4	71.6	144.5	172.2	158.3	212.8	136.8	7.5
Total	1 325.2	1 251.4	2 011.4	1 161.0	1 815.6	3 349.4	1 819.0	

Table A3: Elasmobranchs landings (tonnes) from the bottom trawl fleet reported in Spain between 2002 and 2007. The main part of the bottom trawl fleet is made up of skates, mostly on NAFO area, and they under TACs and quotas (Source: Ministerio de Medio Ambiente, Medio Rural y Marino)

Bottom longliners	**Landed biomass (tonnes)**							
Species	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**Mean**	**%**
Batoidea	7 318.8	9 666.6	8 707.0	5 469.9	5 388.4	4 973.3	6 920.7	56.9
Batoidea	2 606.8	2 554.6	2 184.5	2 357.4	3 276.7	2 792.1	2 628.7	21.6
Fam. Squalidae	510.7	993.1	885.0	572.0	455.3	290.2	617.7	5.1
Fam. Scyliorhinidae	175.5	236.8	431.1	321.0	304.4	313.7	297.1	2.4
Gen. *Scyliorhinus*	339.2	277.4	225.4	243.9	246.2	175.2	251.2	2.1
Elasmobranchs	969.8	200.1	86.5	43.6	16.0	0.2	219.4	1.8
Galeorhinus galeus	198.4	240.1	237.5	205.5	197.7	183.6	210.5	1.7
Elasmobranchs	1 136.4	1 249.7	995.8	857.6	981.6	911.1	1 022.2	8.4
TOTAL	13 255.7	15 418.4	13 752.8	10 070.9	10 866.3	9 639.5	12 167.2	

SRI LANKA

Champa Amarasiri
National Aquatic Resources Research and Development Agency (NARA)

1. BACKGROUND INFORMATION ABOUT THE SHARK FISHERIES

Marine fisheries sector plays an important role in the Sri Lankan economy. The sector contributes around 70 percent of the animal protein consumed in the country. This is largely contributed by the local fishing industry, which in 2006 produced 215 980 tonnes of fish thus accounting for 84 percent of the total quantity of fish consumed. The annual per capita availability of fish and fishery products in the recent past has varied between 17.5 kg and 18.5 kg. The marine fisheries sector is divided into three sub-sectors for administrative and analytical purposes, viz coastal, offshore and deep sea and high seas. Coastal area is defined as the waters above the continental shelf and the average width is 22 km from the coast line. Offshore and deep sea fishing takes place beyond the continental shelf up to the boundary of the EEZ while high sea fishing takes place in international waters (Figure 1).

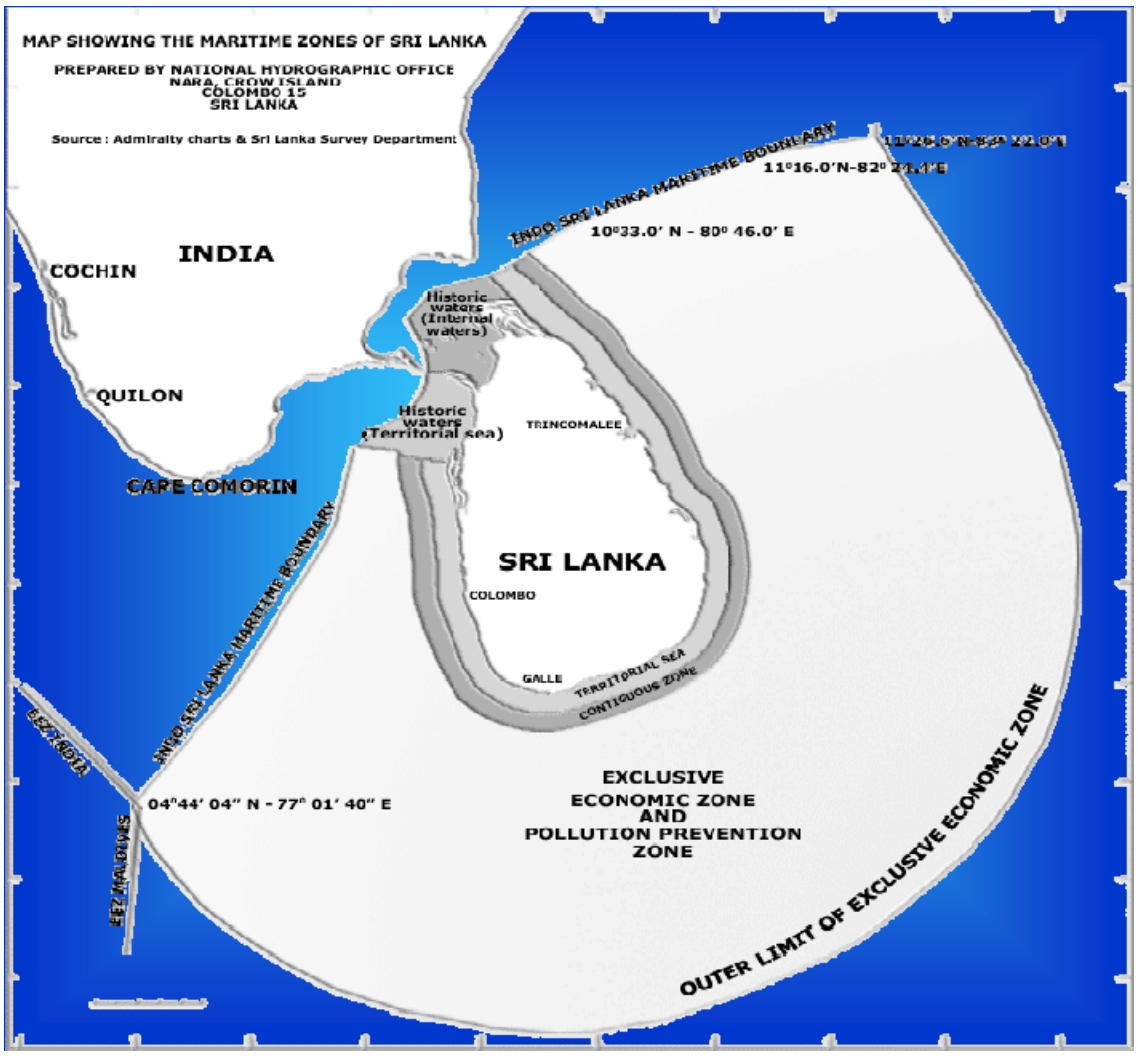

Figure 1: Sri Lanka territory and exclusive economic zone (Source: Survey Department of Sri Lanka).

Sharks are exploited by offshore fisheries as well as coastal fisheries in both pelagic and benthic habitats. The main fisheries involved in shark fishing are offshore gillnet fishery, offshore shark longline fishery, offshore tuna longline fishery and deepwater benthic shark fishery (spiny shark fishery). Sharks are also landed as incidental catches in a number of other fisheries such as bottom-set gillnet fishery for skate, bottom-set gillnet fishery, bottom-set longline fishery and beach seine fishery.

The Offshore shark fishery

The fisheries conducted beyond coastal waters are called offshore fisheries. Fishing takes place mainly in the exclusive economic zone and beyond. Main gears used are large-mesh gillnets and shark/tuna longlines. The fishery has developed since mid 1980s and today, over 2 500 boats operate in the fishery (Table 1). The fishery targeting the migratory stocks of tuna, billfish and sharks was the fastest growing sector in the marine fishing industry during the last two decades; production increasing from 8 665 tonnes in 1990 to 25 006 tonnes in 2000, equivalent to 17 percent of the national fish production. But a declining trend of shark catch can be observed for the last seven years. Sri Lanka contributed 3.1 percent of the global catch of sharks during 1990–2004 being the tenth country of world ranking in shark fishery. In 2004 the contribution reduced to 2.4 percent (Lack and Sant, 2006).

Table 1: Offshore fleet development from 1982–2006 and catches, including sharks

Year	No. of boats	Fish catches	Shark catches
1988	534	20 078	3 927
1989	650	24 440	4 314
1990	775	31 000	8 665
1991	900	36 000	22 168
1992	1 025	41 000	18 445
1993	1 150	46 000	15 106
1994	1 275	54 704	9 047
1995	1 639	76 112	19 462
1998	1 639	73 240	20 941
2000	1 430	84400	25 006
2001	1 572	87 360	20 700
2002	1 614	98 510	11 108
2003	1 530	90 830	12 805
2004	1 581	98 720	7 566
2005	na	na	2 390
2006	2 613	94 620	2 101

The drift longline fishery

The drift longline fishery for sharks (shark longline fishery) is an offshoot of the tuna longline fishery which was introduced to Sri Lankan fisheries in the late 1950s along with the introduction of the new 3.5 GT inboard engined craft. Each of these new boats was provided with twenty bundles of tuna longline. However, the high cost of bait and low catches of tuna has limited the popularity and expansion of tuna longlining. Instead, fishermen were forced to use cut pieces of tuna, dolphin, etc., as bait and began landing more and more sharks and the tuna longline fishery gradually transformed into a drift longline fishery for sharks. Drift longline fishery for shark was usually conducted by the 3.5 GT coastal day boats and the offshore multi-day boats. While the coastal day boats use up to 200 hooks per operation, the offshore boats use 350–500 hooks per operation.

The main line is 5–6 mm diameter and made of kurolon, polyethylene, polypropylene or polyamide. The use of kurolon has declined in recent years and more polyethylene and polypropylene lines are now being used. Branch lines are 4mm diameter and 7–17 m in length, and the distance between two branch lines 15–27 m so that each bundle consisting of five hooks would be 75–135 m in length. With a buoy line of 3–10 m length, the fishing depth of the lines range from 10 to 27 m from the surface. When used in combination with a drift gillnet the shark longline is shot first, followed by the net.

Personal communications with fishermen revealed that off west coast of Negombo, about 15 multi-day boats of over 13 m are exclusively engaged in drift longline fishing for sharks. Most of these boats are reported to undertake fishing trips which last one to one and half months and, one boat is claimed to have spent 52 days

on a single trip. About 1 000 hooks (200 bundles) are used during fishing operations. With such extended trips, the fishery is primarily for the lucrative shark fin export trade. The fish brought on ice is of poor quality and often converted into dried fish.

Offshore shark long lining was very popular in early 90s. In 1993/94 period the average number of fishing operations of shark longline per month was 2496. Maximum catches of sharks were reported in 1999 and 2000.

Tuna longline fishery

The offshore tuna longline fishery is reported to have been in use in Sri Lanka for the last 40 years. Because of the high price and the target species are fetching, and as a result it has got spread to virtually every major fishing town in the country.

Fishing is carried out in the offshore region during the period December to March in the southern and the western waters, while in the eastern region fishing is done from May to November. In the northwest and Southwest Coast of Sri Lanka fishers on small boats also have started the operation of this gear ten years back. Tuna longlines operated from Sri Lanka are similar to those typical Japanese tuna longlines. Most of the fishers make the complete gear with monofilament lines. The main line is usually a No. 250–400 monofilament. Tarred Kuralon ropes of 4–6 mm diameter are also used as the main line. 10–40 m length of No. 200–300 monofilament is used as branch lines. Different length of branch lines within the above are fixed to the main line on a random basis. Branch lines are attached to the main line at every 3050 m. G–7 type buoys are attached to the main line at every 5–6 hooks; by 3–4 mm polypropylene buoy lines of about 40 m in length. Swivels are used for the main lines and the branch lines to prevent excessive twist of the lines. Standard shark hooks are attached to the branch line through pieces of 2 m SS wire.

About 100–200 hooks are shot off a 3.5 tonnes boat while the No. of hooks used on a small boat ranges between 50–75. Baits used in this fishery are squid/cuttlefish, herrings, flying fish and scads.
Both offshore gillnet fishery and longline catch sharks as by-catch.

The species composition of sharks in an experimental fishery conducted using both gillnets and longlines are given in the Table 2.

Table 2: Species composition of sharks in tuna longline and drift gillnet fisheries conducted within EEZ of Sri Lanka (percentage by weight and number) in 1996 (source Joseph, 1999).

Species	Drift gillnet fishery		Tuna longline fishery	
	% weight	% number	% weight	% number
Silky shark	74.3	88.5	32.6	44.8
Blue shark	11.2	2.2	46.3	31.4
Oceanic whitetip shark	3.1	2.9	2.6	4.0
Shortfin mako shark	3.9	1.0	7.7	7.7
Longfin mako shark	0.6	0.2	1.6	1.8
Thresher shark	3.4	3.9	4.4	4.4
Pelagic thresher shark	–	–	0.7	1.0
Big-eye thesher shark	–	–	0.4	0.4
Smooth hammerhead shark	1.7	0.7	0.6	0.4
Scalloped hammerhead shark	1.8	0.5	3.1	4.0

Deepwater benthic shark fishery

This fishery is carried out in the deeper waters (150–200m) of the continental slope targeted for *Centrophorus uyato* and *C. granulosus*. The fishing takes place off the northwest (Battalangunduwa Island

and Talawila), south west (Panadura, Beruwala) and south (Mirissa) parts of the country. The resources are also available in the east coast but there is no established fishery in the area. The fishery is seasonal and starts in September and lasts until the end of February of the following year. The estimated production for Northwestern shark production for 2004 was 194 877 kg and 260 000 kg in 2007.

Craft and gear used in deepwater benthic shark fishery

In the Kalpitiya Penninsula , 5–5.5 m fibre glass boats are used for this fishery. These crafts are powered by 10–15 hp outboard engines. Total number of boats engaged in the fishery is around 80–90. The fishery is conducted using baited hooks. The average number of hooks per boat ranges from 550–900. *Escualosa thoracata, Hilsa kelee, Nematalosa nisus, Sardinella fimbriata* and other sardinella species are the popular baits for this fishery (Dissanayake, unpublished). The operational depth varied from 150–2000m. The fishing starts around 9.00 pm and making approximately 10–12 hours of fishing.

Shark species in Sri Lankan landings

Taxonomy of sharks has been relatively neglected by Sri Lankan fish taxonomists, possibly on account of the difficulties inherent in many species, as well as the paucity of specimens. Various authors have from time-to-time attempted to catalogue the Sri Lanka sharks. Mendis (1954) listed 15 species and Munro (1955) upgraded the list to 22. De Silva (1984) listed 44 confirmed and 11 unconfirmed species in his check list. Several of these unconfirmed species have subsequently been recorded in Sri Lanka waters. Amarasooriya and Dayaratne (1994) listed 44 species from the west and south western coast landings and Amarasooriya (1999) added 4 more species to the list. The two species of gulper sharken in the deep water longline fishery. Three species recorded by Munro (1955), namely *Atelomycterus marmoratus*, *Hemigaleus balfouri* and *Chaenogaleus macrostoma* were not recorded in the study by Amarasooriya and Dayaratne (1994). Further, Amarasooriya and Dayaratne (1993) also contend that the two species described by Munro (1955) as Tawny nurse shark, *Nebrius concolor* (Ruppell, 1837) and Rusty shark, *Ginglymostoma ferrugineum* (Lesson, 1830) are synonyms of Tawny nurse shark, *Nebrius ferrugeneus* (Lesson, 1830), as described in Compagno (1984). Nine species, *Notorhyncus cepedianus* (Peron, 1807), *Chiloscyllium plagiosum* (Bennet, 1830), *Eugompohdus taurus* (Rafinesque, 1818), *Chaenogaleus macrostoma* (Bleeker, 1852), *Hemigaleus microstoma* (Bleeker, 1852), *Carcharhinus amblyrhynchoides* (Whitely, 1934), *C. dussumieri* (Valenciennes, 1839), *C. sealei* (Pietschmann, 1916) and *Rhizoprionodon oligolinx* (Springer, 1964) recorded by De Silva (1984) were not recorded by Amarasooriya and Dayaratne (1993). De Silva (1984) recorded the presence of great white shark, *Carcharodon carcharius*, but no further records have been made of this species in Sri Lanka. De Bruine, Russel and Bogusch (1994) included 43 species as being of interest to the marine fisheries industry. The latest study by De Silva (1999) accepts 61 species of sharks belonging to 5 orders and 17 families. These species comprise the currently known shark species from both the territorial waters of Sri Lanka and the exclusive economic zone. However it is important to note that a few species of sharks caught extra-territorially are some times unloaded in Sri Lankan ports. Although 40–61 species have been recorded from Sri Lanka, only about 12 species dominate the landings (Tables 3 and 4).

Taxonomy of Sri Lanka's skates and rays has received even less attention. Munro (1995) included 29 species while De Bruine, *et al.,* (1994) accepted 30 and updated the taxonomy. De Silva (1999) included a total of 31 species from four orders and nine families as being present in Sri Lankan waters. The author also suspects that many species of rays remain to be documented from Sri Lankan waters.

Table 3: Species composition of shark landings in Sri Lanka (percentage by weight).
Source: Williams (1995) and Dayaratne *et al.* (1996)

Species	Coastal fishery		Offshore fishery	
	1994	**1995**	**1994**	**1995**
Silky shark	61.2	71.3	59.4	56.4
Blue shark	1.0	13.9	12.7	11.7
Oceanic whitetip shark	0.1	0.1	7.9	8.7
Other requiem sharks	2.2	1.2	2.7	4.8
Mako shark	6.2	10.5	6.7	4.5
Thresher shark	15.8	2.4	3.6	6.0
Hammerhead shark	9.2	0.6	6.3	6.7
Other sharks	4.3	–	0.7	1.2

Biology

Biology of the Sri Lankan sharks is even less studied subject. Few attempts have been made to study the population dynamics of silky sharks. It was estimates that the asymptotic length and growth coefficient of silky shark were 325 cm and 0.3 per year respectively. The recruitment pattern of *C. falciformis* showed one peak around late July to early August.

Socio-economic aspects

Shark fins

Shark fisheries are always associated with other fisheries. Therefore there is no separate socio economic analysis for shark fisheries. The shark fisheries do create wealth in the case of the export of shark fins from deepwater benthic shark fishery and make a significant contribution to the economy. There is no information on the division of income between the fishers, processors and exporters.

The shark fin industry in Sri Lanka is poorly documented. The only source of information available is export figure maintained by the Sri Lanka Customs. The retail value of fins varies with species, fin type condition and regional preference.

Shark fins have been exported from Sri Lanka since late 60s. The trade has developed rapidly over the last decade due to high economic gain. In 1999 the country exported about 89 tonnes of shark fins worth Rs 170 million (about US$ 1.5 million).

The fins are exported to 6–10 countries, including China, Hong Kong SAR, Singapore, Malaysia, Maldives and China but most of the products go to China, Hong Kong SAR and Singapore where they are further processed for fin rays or fin needles (Table 5). Exports are high in the months of May and June due to festive season in China.

Table 4: List of shark species identified in fish landings

Family	Species	Common English name
Hexanchidae	*Hexanchus griseus*	Cow shark
Squalidae	*Centroschyllium ornatum*	Ornate dogfish
	Centrophorus moluccensis	Gulper shark
	C. uyato	Gulper shark
	Dalatias licha	Kitefin shark
Echinorhinidae	*Echinorhinus brucus*	Bramble shark
Hemiscylliidae	*Chiloscyllium griseum*	Grey bamboo shark
	C. indicum	Slender bamboo shark
Ginglymostomatidae	*Nebrius ferrugineus*	Tawny nurse shark
Stegostomatidae	*Stegostoma fasciatum*	Zebra shark
Rhinodontidae	*Rhinodon typus*	Whale shark
Odontasididae	*Odontaspis noronhai**	Bigeye sandtiger shark
	*O. ferox*8*	Small tooth sand tiger shark
Pseudocarchariidae	*Pseudocarcharias kamoharai*	Crocodile shark
Alopidae	*Alopias pelagicus*	Pelagic thresher shark
	A. superciliosus	Bigeye thresher shark
	A. vulpinus	Thresher shark
Laminidae	*Isurus oxyrinchus*	Shortfin mako shark
	I. paucus	Longfin mako shark
Triakidae	*Mustelus manazo*	Starspotted smooth hound shark
	M. mosis	Arabian smooth hound shark
Hemigaleidae	*Hemipristis elongatus*	Snaggletooth shark
Carcharhinidae	*Carcharinus altimus*	Bignose shark
	C. albimarginatus	Silvertrip shark
	C. amblyrhynchos	Grey reef shark
	*C. amboinensis**	Pigeye shark
	C. brevipinna	Spinner shark
	C. falciformis	Silky shark
	C. hemiodon	Pondicherry shark
	C. limbatus	Blacktip shark
	C. longimanus	Oceanic whitetip shark
	C. macloti	Hardnose shark
	C. melanopterus	Blacktip reef shark
	*C. plumbeus**	Sandbar shark
	C. sorrah	Spot-tail shark
	C. wheeleri	Blacktail reef shark
	Galeocerdo cuvier	Tiger shark
	*Lamiopsis temmincki**	Broadfin shark
	Loxdon macrorhinus	Sliteye shark
	*Negaprion brevirostris**	Lemon shark
	Prionace glauca	Blue shark
	Triacnodon obesus	Whitetip reef shark
	Rhizoprionodon acutus	Milk shark
	Scolidon laticaudus	Spadenose shark
Sphyrnidae	*Eusphyra blochii*	Winghead shark
	Sphyrna lewini	Scalloped hammerhad shark
	S. mokaraan	Great hammerhad shark
	S. zygaena	Smooth hammerhad shark

* Only one specimen recorded.

Table 5: Shark fin exports from Sri Lanka (2007 and 2008 up to August)

Country	2007 (kg)	2008 (kg) up to August
China, Hong Kong SAR	63 247	28 756
Malaysia	2 786	503
Singapore	190	1 279
Maldives	200	0
Bahrain	162	0
Australia	60	0
China	0	4 210
Cyprus	0	162
Mauritius	0	2 500
Taiwan, Province of China	0	1 500

Dried fins of silky shark, oceanic whitely and hammer head sharks, greater than 12" fin-base length fetch Rs.3 000–4 200/kg. The price paid in wet form is around Rs.1200–1 300/kg. Large fins of species such as blue shark and the threshers fetch Rs.2 800/kg in dried form and Rs. 600/kg in wet form. Medium size fins between 8" to 12" fin-base length fetch Rs.2 100/kg (dry) and Rs.800/kg (wet). Smaller fins of less than 8" fin-base length are paid Rs.1 500/kg (dry) and Rs.500/kg (wet). The quantity and value of shark fins exported since 1990 are given in Table 6. In addition, cleaned shark jaws and teeth are available for sale, mainly to tourists. However, no information is available on the quantities sold or the income generated through such sales. Unconfirmed reports suggest that prices for cleaned shark jaws range from Rs.500 to 3 000.

Table 6: Quantity and value of shark fins exported from Sri Lanka (Source: Statistical Unit, Dept. of Fisheries and Aquatic Resources).

Year	**Quantity (tonnes)**	**Value (Rs. million)**
1990	51.38	35.13
1991	182.24	108.62
1992	89.55	135.16
1993	58.60	98.93
1994	81.15	110.37
1995	126.88	162.81
1996	52.3	111.51
1997	83	183.0
1998	77	138.0
1999	89	170.0
2000	119	305.0
2001	85	242.0
2002	83	215.0
2003	83	336.0
2004	110	343.0
2005	74	165.0
2006	75	140.0
2007	67	127.0

Shark oil
Deep benthic shark fishery is mainly exploited to extract squaline rich liver oil which has a high demand in the international market. It is estimated that nearly 78 000 kg of oil is extracted and exported to Japan. Export figures, and other socio-economic information related to this fishery is not available. It was observed that fishing effort has decreased for the last few years mainly due to the lack of proper market facility to export products. However, the situation is improving as there are two more buyers involved in the fishery.

Number of fishers involved in shark fisheries and their geographical spread

The number of fishers in the marine sector has increased from 79 686 in 1921 to 98 444 in 1989 (Sivasubramanium, 1995) and to nearly 120 000 in early 90s, inclusive of those who are engaged in aquaculture. In addition, some 30 000 people are reportedly employed in related and service activities such as fish trade, processing, boat building, fishing gear manufacture, etc. The sector currently provides direct employment to about 650 000 people comprising 150 000 in fishing, 100 000 in associated service activities and 400 000 in fish trade. Number of fishers involved particularly in shark fisheries is not reported. However, it is estimated that nearly 15 000 fishers are engaged in offshore fisheries in general. Out of that, between 250–300 are engaged in shark longline fishery. In addition nearly 200 fishers are engaged in spiny shark fishery mainly from Northwestern area.

2. FISHERY AND TRADE MONITORING SYSTEMS

Agencies involved in information collections

Statistical unit
The principal entity involved in fisheries statistics collection is the Statistical Unit (SU) of the Ministry of Fisheries and Ocean Resources. The Department of Fisheries and National Aquatic Resources Agency (research institute under the Ministry of Fisheries) are the actual data collectors. SU act as the central collation agency of fisheries statistics. Ceylon Fishery Harbours Cooperation, Ceylon Fisheries Cooperation and Sri Lanka Customs are also involved in data collections relevant to their interests. Fishing boat Owners Association, Fish Trader Organizations, Fishing boat and gear manufacturers, boat builders, some ice and fuel suppliers may maintain fisheries related data for their own interests. The SU prepares regular fisheries statistical reports for four main agencies: MFOR, Central Bank of Sri Lanka, Dept. Census and Statistics and FAO.

NARA
NARA collects offshore fisheries data mainly for stock assessments purposes. The NARA programme covers 36 species including six tuna species, two species of seer, four species of billfishes and eight species of sharks. The data collected are total number of boats landed/day for each category and some length data of tuna, bill fish and some shark species. The landing survey by NARA covers selected harbours and anchorages from each fishing zone. The landings of offshore boats take place in western, southern and eastern coasts only. The landing area is divided into seven fishing zones. At least 30 percent of the landed boats are sampled. Sampling is carried out 10 days per month per zone by two samplers.

Department of Fisheries (DFAR)
The monitoring of coastal fisheries (artisanal fisheries) is conducted by Department of Fisheries. There are 15 Fisheries Administrative Districts along the coastal zone of the country to administrate the fisheries activities. Each District has number of Fishery Inspectors. These Fisheries Inspectors are assigned to various duties including data collection. Generally they visit the landing sites one day per week particularly to collect fish statistics. They select well representative landing sites within their division to collect statistics to estimate the monthly production. They interview fishers and fisher's organizations to verify the figures.

Sri Lanka Customs (SLC)
Sri Lanka Customs collect export and import data of fishery products and currently they have the authority of controlling export and import of shark products.

Reporting
The SU prepares four types of reports for the MFOR:

- Weekly fish prices report;
- Monthly fisheries statistics report;
- Quarterly fisheries statistics report and,
- Annual fisheries statistics report.

The Central Bank requires the SU to produce a monthly report on fish production, subsidies to the fisheries sector, fish imports and fish exports. The report must conform to a special format required by the Central Bank.

NARA prepares an annual report on large pelagic fish production for MFOR, with production presented on a monthly basis. NARA produces annual statistics on tuna and tuna like fishes and shark data to the IOTC. The data includes nominal catches, discards, fishing craft statistics, effort and biological information on important species.

Major limitations encountered in data collection and reporting

The major limitations encountered in the information collection are lack of adequate staff including scientists, taxonomists, samplers and data entry operators. Currently NARA has only one scientist, 12 samplers and one data entry operator to cover entirely offshore fisheries. Their main interest is for tuna landings. As there are 14 harbours, 36 anchorages and nearly 600 beach landings at least the staff should be doubled and some should be dedicated to collect shark catch information to obtain scientifically acceptable catch information regarding the fisheries.

The others limitation is the lack of funds to expand the sampling programme. The existing allocation is not adequate to expand and improve the sampling programme as it would involves additional traveling, training, awareness material, etc.

Lack of adequate base line information is also another limitation to improve and reorganize the sampling strategies. Therefore it is needed to conduct a quick frame survey prior to establish such sampling and information collecting programme.

Existing legal and policy support

The ten year development policy framework
The ten year development policy framework of the fisheries and aquatic resources sector (2007–2016) provided the policy direction for offshore and high seas fishery management in general. The plan also highlighted the importance of conservation of the coastal and aquatic environments and promotion of principles of responsible fisheries.

Fisheries act and regulations
The Fisheries and Aquatic Resources Act No.2 of 1996 establishes the basic institutional framework required for fisheries management. The Act lays emphasis on management of fisheries and sustainable development with due recognition of conservation measures. Some of the most important new provisions are (a) licensing of all major fishing operations, (b) declaration of areas for fisheries management and (c) conservation. All important fisheries are to be brought under a licensing scheme for the first time, effectively limiting entry to otherwise open access fisheries. About 80 regulations have already being Gazetted under this Act – concerning registration of fishing boats, licensing of fisheries, registration of fishermen, fisheries in selected lagoons, export of live fish, fish landings, gear regulations for inland fisheries, regulations for aquaculture activities and furnishing information on fisheries and catches and handling and distribution of fish.

The legislation pertaining directly to the shark and shark related fisheries is very limited. The only regulation gazetteed under Fisheries Act is Regulation of the Landings of Fish (Species of Shark and Skates) Regulations, 2001. The regulation says “A licence holder (Licence holder means a person who is in possession of a valid licence issued under the Fishing Operations Regulations of 1996 published in gazette Extraordinary No 948/25 of November 07, 1996) may land fish belonging to the species of Sharks or Skates,

so long as the fins of such species of fish are attached to such fish. And no licence holder shall land only the fins which have been removed from any fish belonging to the species of shark or skate"

The Fauna and flora protection Act

The Fauna and Flora protection Act of Sri Lanka is being amended and it is proposed to include Whale shark as protected species.

IOTC

There is no national management plan particularly to manage the shark fisheries. However Sri Lanka is involved in regional management plans. IOTC has taken initiative in 2005 to manage the Indian Ocean Sharks under the IOTC Resolution 05/05. The main objective is to ensure the sustainability of shark stocks as well as to adopt a National Plan of Action for the conservation and management of sharks. As a member of the IOTC Sri Lanka has the responsibility of providing required data to implement conservation and management measures. Sri Lanka provides catch and effort data of shark fisheries to IOTC annually.

NPOA

Offshore fisheries management plan is being prepared mainly to address the tuna fisheries development. No separate attempts have been made to prepare a shark management plan. However, Sri Lanka has been requeting FAO for technical and financial assistance to prepare the NPOA – Shark for Sri Lanka. Further Bay of Bengal Program (BOBP-IGO) has had a Regional Consultation on Preparation of Management Plan for Shark Fisheries in 28–29 March 2008. The participated countries were India, Sri Lanka, Maldives and Bangladesh.

References

Amarasiri, C. 2000. Shark fin trade in Sri Lanka. Will it sustain for long? Vol 18. No 3 September 2000.

Amarasooriya, D. and Dayaratne P. 1993. A species Identification of the shark catches landed in the west and south-west coasts of Sri Lanka, Proceed. 1st Ann. Sci. Sessions, National Aquatic Resources Agency, Colombo, Sri Lanka.

Amarasooriya, P.D.K.D. 1999. Species Identification of the shark catches landed in the west coast of Sri Lanka with special reference to the silky shark (*Carcharhinus falciformis*) M Phil thesis.

Dayaratne, P., Maldeniya, R. and Amarasooriya, D. 1996. Large Pelagic Fisheries in Sri Lanka, Annual Fishery statistics 1995. National Aquatic Resources Agency, Colombo, Sri Lanka (unpublished).

De Bruine, G.H.P., Russell, B.C. and Bogusch, A. 1994 A field guide to The Marine Fishery Resources of Sri Lanka FAO, Rome 62–78.

De Silva, R.I. 1984 The great white shark Carcharodon carcharias in Sri Lanka Loris XX(1): 10–11.

De Silva, R.I. 1988 The sharks of Sri Lanka, a key to the different species and a preliminary checklist. Ceylon Journal of Science (Bio. Sci) Vol 17 and 18: 56–64.

Dissanayake. 2003. Review of the spiny dogfish shark fishery in the Northwestern coastal region of Sri Lanka Unpub. report.

Joseph, L. 1997. Management of shark fisheries in Sri Lanka Unpub Report 1–42.

Joseph, L. 1999. Management of shark fisheries in Sri Lanka, Case studies of the Management of elasmobranch fisheries FAO Fisheries Technical Paper 378/1

Lack, M. and Sant, G. 2006. World Shark Catch, Production and Trade 1990–2003. Paper to the Technical Workshop on the Conservation and Management of Sharks, Intersessional Shark Working Group of the CITES Animals Committee. Australian Department of the Environment and Heritage and TRAFFIC Oceania

Mendis, A.S. 1954 Fisheries of Ceylon (a catalogue, key and bibliography) *Bull. Fish. Res. Stn.*, Colombo, Ceylon 2. 1–6.

Munro, I.S.R. 1955. The Marine and Fresh Water Fisheries of Ceylon. Dept. Ext. Affairs, Canberra.

Sivasubramaniam, K. 1992 Pelagic sharks in the Indian Ocean (with particular reference to the Bay of Bengal Region)

Sivasubramaniam, K. 1995. Sri Lanka Fisheries Resources, Development and Management in the Past. Proceedings of the National Seminar "Towards a new Era in Fisheries Development", Ministry of Aquatic Resource Development, Colombo, July 1995.

Williams, H. 1995. Production Estimates for the Sri Lanka fishery for large pelagics in 1994. FAO. Colombo, FI:TCP/SRL/2251, Field Document 3 (unpublished).

UNITED STATES OF AMERICA

John Carlson, Karyl Brewster-Geisz and Brad Wiley
National Marine Fisheries Service

1. BACKGROUND INFORMATION ABOUT THE SHARK FISHERIES

Fisheries that catch elasmobranch species in the United States can be divided into four general categories: directed commercial, incidental commercial, directed recreational, and incidental recreational. Directed fisheries are those that target sharks, skates and rays, whereas incidental fisheries catch sharks secondarily while fishing for other species. In virtually every fishery there are incidental catches or bycatch of sharks. Gillnet, longline, trawl, purse seine, pot, and hand-gear fisheries all experience some level of shark catches with varying levels of shark bycatch and bycatch mortality. Some fisheries have both catch and bycatch of sharks in that some species are retained while others are discarded, depending on market value.

Atlantic and Gulf of Mexico commercial fisheries
The main directed commercial fisheries that catch sharks in Federal waters along the United States Atlantic and Gulf of Mexico coasts include the pelagic longline fishery, the bottom longline fishery, and the shark coastal gillnet fishery. Other commercial fisheries in the Atlantic Federal waters are mostly incidental in nature and include shark handgear, swordfish handgear, tuna purse seine, tuna handgear, tuna harpoon, coastal gillnet, shrimp trawl, and menhaden purse seine. The authorized gears for directed and incidental fisheries for Atlantic sharks in Federal waters are longline, gillnet, rod and reel, handline, and bandit gear.

Fishing gear types that result in shark catches can vary from gillnets that drift on the ocean's surface to those that are sunk and fished on the bottom. Both the bottom longline and gillnet fisheries are generally active in the northwest Atlantic Ocean and Gulf of Mexico. Bottom longline fishermen have generally targeted sandbar, *Carcharhinus plumbeus*, and blacktip sharks, *Carcharhinus limbatus*, but also catch and land hammerhead, *Sphyrna* spp. bull, *Carcharhinus leucas*, and blacknose sharks, *Carcharhinus acronotus*. Bottom longline characteristics vary regionally with gear normally consisting of about 2.9–43.4 km of weighted longline and 500–1500 hooks (Hale and Carlson, 2007). Shark gillnet fishermen target smaller coastal sharks such as Atlantic sharpnose, *Rhizoprionodon terraenovae*, blacknose, finetooth, *Carcharhinus isodon*, and blacktip sharks. Some vessels use their net to encircle a school of sharks. Nets can be up to 2 km in length of varying mesh size from 7.3–30.4 cm (Carlson and Bethea, 2007).

Pelagic sharks are typically caught incidentally in the commercial tuna and swordfish pelagic longline fisheries. The pelagic longline gear varies depending on area and target but in general consists of a heavy monofilament mainline (7–65 km long), which is suspended at various depths below the surface and from which are suspended numerous lengths of lighter monofilament line with a single large hook at the end. Hooks are placed along the line at a ratio of 11–19 hooks/km, resulting in a total of 80–1 200 hooks. The gear free-floats on the surface of the ocean, with the hook depths varying from 35 to 60 m (Beerkircher *et al.,* 2004). Shortfin mako, *Isurus oxyrinchus*, porbeagle, and thresher, *Alopias* spp., sharks are the pelagic species that are most likely landed due to relatively high ex-vessel prices. However, few sharks are landed due to the relatively low ex-vessel prices compared to ex-vessel prices of tuna and swordfish and the need to keep shark meat separated from the tunas and swordfish in the hold. Some shark species, particularly blue sharks, *Prionace glauca*, are frequently discarded because of their unpalatable meat.

Currently 214 United States fishermen are permitted to target sharks (excluding dogfish) in the Atlantic Ocean and Gulf of Mexico, and an additional 285 fishermen are permitted to land shark incidentally. Recent amendments to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan based on updated stock assessments are expected to eliminate the major directed shark fishery in the United States Atlantic. The amendments implement a shark research fishery, which allows the United States National Marine Fisheries Service (NMFS) to select a limited number of commercial shark vessels on an annual basis to collect life history data, and data for future stock assessments. Furthermore, the revised measures affect quotas, drastically reduce retention limits, and modify the authorized species in commercial shark fisheries. Specifically, commercial shark fishermen not participating in the research fishery are no longer allowed to

land sandbar sharks, which have been the main target species for most fishermen. Additionally, commercial fishermen are required to maintain shark fins naturally attached to the shark carcass through landing. The revised measures also affect authorized species in recreational shark fisheries; modify time/area closures for commercial shark vessels deploying bottom longline gear; and modify regions, seasons, and shark dealer reporting frequency in the commercial shark fishery.

The United States fishery for spiny dogfish targets large individuals (larger than 2.3 kg in weight, and 83 cm in length), which are primarily mature females, to meet processing and marketing requirements (NEFSC, 2006). Spiny dogfish are also frequently caught as bycatch in a large numbers and discarded during groundfish operations. The principal commercial fishing gears used to catch spiny dogfish are otter trawls, longlines and sink gillnets. The fishery for spiny dogfish operates in the northwest Atlantic Ocean from North Carolina north to the Gulf of Maine. Recreational catches of spiny dogfish are of little significance.

The principal commercial fishing method in the Atlantic Ocean used to catch skates and rays is otter trawling (NEFSC, 2000). However, skates can be caught commercially with trawl, gillnet, longline, handline, and dredge fishing gear. There are seven species of *Raja* occurring along the North Atlantic coast of the United States that are captured regularly in fisheries: little skate (*Raja erinacea*), winter skate (*Raja ocellata*), barndoor skate (*Raja laevis*), thorny skate (*Raja radiata*), clearnose skate (*Raja eglanteria*), rosette skate (*Raja garmani*), and smooth skate (*Raja senta*). Skates have been reported in New England fishery landings since the late 1800s. Reported landings of skates have increased substantially in recent years, partially in response to increased demand for lobster bait domestically and for skate wings in export markets. However, improved statistical data collection may also account for some portion of the increase in reported landings. Wings are taken from winter and thorny skates, the two species currently known to be used for human consumption. Bait landings are likely composed primarily of little skate, based on areas fished and known species distribution patterns.

Eastern Pacific commercial fisheries

Pelagic sharks are harvested in commercial fishing in United States Pacific waters in the driftnet fishery off California and incidentally in the commercial tuna and swordfish pelagic longline fisheries. The driftnet fishery targets common thresher shark and shortfin mako (Holts *et al.,* 1998). California legislation established the drift gill net fishery as a limited entry fishery. In 2006, there were 89 permits issued in the drift gillnet fishery, down from 150 permits in 1980. Most catches of shark in pelagic longline fisheries are incidental, but at times shortfin mako and thresher sharks are targeted directly (Holts *et al.,* 1998). Both the drift net and pelagic longline fisheries commonly catch blue sharks, but this species is typically discarded because of their unpalatable meat.

The west coast groundfish fishery operates over a broad depth range with significant fishing activities by trawl, longline and pots out to 1 500 m. There is a limited commercial fishery for spiny dogfish, primarily harvested with bottom trawls. Trawls also encounter brown cat shark, *Apristurus brunneus*, filetail cat shark, *Parmaturus xaniurus*, and longnose cat shark, *Galeus longirostris*, which indicates that these species probably are bycatch in this deepwater fishery.

In the Bering Sea and Aleutian Islands (BSAI), the three shark species most likely to be encountered in trawl and longline fisheries are the sleeper shark (*Somniosus pacificus*), the piked or spiny dogfish shark (*Squalus acanthias*), which are both member of the family Squalidae, and the salmon shark (*Lamna ditropis*). Spiny dogfish are demersal, occupying shelf and upper slope waters from the Bering Sea to the Baja Peninsula in the North Pacific, and worldwide in non-tropical waters. Pacific sleeper sharks range as far north as the Arctic Circle in the Chukchi Sea west off the Asian coast and the western Bering Sea, and south along the Alaskan and Pacific coast. Salmon sharks range in the North Pacific from Japan through the Bering Sea and Gulf of Alaska to southern California and Baja, Mexico. They are considered common in coastal littoral and epipelagic waters, both inshore and offshore. Salmon sharks have been considered a nuisance for both eating salmon and damaging fishing gear and investigated as potential target species in the Gulf of Alaska. Salmon sharks are rarely encountered in commercial fisheries or bottom trawl surveys in the BSAI.

There are no directed fisheries for sharks in the Bering Sea or Aleutian Islands (BSAI), but some incidental catch of sharks results from directed fisheries for commercial species. Most incidentally captured sharks are not retained. Spiny dogfish are allowed as retained incidental catch in some managed fisheries, and salmon

sharks are targeted by some sport fishermen in Alaska state waters. Incidental catches of shark species in the BSAI fisheries have been very small compared to catch rates of target species. Recently a plant in Kodiak has been retaining some spiny dogfish.

Sharks in the BSAI are currently managed in aggregate as part of the "other species" complex in the BSAI Fishery Management Plan (FMP). The other species complex includes sharks, skates, sculpins, and octopus. All of the other species are considered ecologically important and may have future economic potential. The Total allowable catch (TAC) for the other species complex is constrained by the BSAI optimum yield (OY) cap of two million metric tons. Sharks have only been reported to species in the catch since 1997 and have made up from one percent to five percent of "other species" catch from 1997–2006.

In the Gulf of Alaska (GOA), sharks have also been managed as part of the "other species" complex, with catch reported only in the aggregate with octopus, squids, and sculpins. The shark species complex in Alaska may consist of up to 10 species, however, spiny dogfish, Pacific sleeper shark, and salmon sharks are by far the three most common species caught. There is no directed fishery for sharks in the GOA at this time. Spiny dogfish and Pacific sleeper sharks are taken incidentally in bottom trawl and longline fisheries, but most sharks are not retained. In 2007, 637 tonnes of sharks were reported caught in the GOA. This represented 30 percent of the total catch in the other species complex. On average since 1997, sharks catches have been just over 1 000 tonnes and accounted for approximately 26 percent of the other species complex.

Western, Central and South Pacific fisheries

The United States Flag Pacific Islands comprise the State of Hawaii, the Territories of American Samoa and Guam, the Commonwealth of the Northern Marianas, and six other United States Flag Pacific Island groups under military (Wake Island, Johnson Atoll) or Federal (Howland and Baker, Jarvis, Kingman Reef and Palmyra Atoll, Midway) control. A tuna and swordfish longline fishery operating out of Hawaii is the largest federally regulated United States domestic fishery in the western and central Pacific. Longline fishermen must use circle hooks and certain types of bait to reduce sea turtle bycatch. A smaller artisanal longline fishery also operates out of Pago Pago, American Samoa. The balance of pelagic fisheries production is generated by small troll and handline vessels and by a small skipjack pole-and-line fleet in Hawaii. Nearshore fisheries, such as troll and handline, come primarily under the management authority of the state or territorial governments. A United States purse seine fleet operates under an international treaty in the Western Pacific.

The United States Pacific longline fisheries do not target sharks. Blue sharks are the most common shark species taken. They are caught more frequently in the shallow-set swordfish longline fishery (an average of 25 sharks per set) than in the deep-set tuna longline fishery (an average of 9.5 sharks per set). Most tuna vessels, unlike swordfish vessels, use wire traces on their gear at the end of branch lines. This causes blue sharks to be retained on the line in the tuna fishery more frequently than in the swordfish fishery. However, 66 percent of the blue sharks are released by the crew cutting the branch line, which likely results in high survivorship. Bigeye thresher, the pelagic thresher, the common thresher, the shortfin mako, and the longfin mako are also caught on longline gear although these species are more likely going to be caught in gillnet gear off California. Sharks caught most commonly by small-scale gears along insular islands are makos and threshers, silky (*Carcharhinus falciformes*) and Galapagos (*Carcharhinus galapagensis*) (Dalzell, Laurs and Haight, 2008).

United States recreational fisheries

Recreational fisheries targeting sharks have existed in the United States for many years. Many recreational anglers use hook and line gear from beaches, piers, or boats in coastal waters (NMFS, 2007). Charter vessel fishing for sharks is becoming increasingly popular in the western Atlantic Ocean although target species vary by region. Atlantic sharpnose and blacktip sharks are targeted in the southeast Atlantic and Gulf of Mexico regions, whereas shortfin mako and thresher shark are targeted in the northeast Atlantic regions. California supports a large recreational fishery that actively targets sharks, mostly shortfin mako, thresher, blue, and leopard sharks, *Triakis semifasciata*. In Oregon and Washington, anglers while fishing for Pacific salmon and bottomfish, catch spiny dogfish and limited numbers of other sharks incidentally, but the recreational dogfish catch in Washington is large. Alaskan anglers have shown increasing interest in salmon shark fishing in recent years, but the fishery remains small.

Several tournaments target sharks. Many shark tournaments occur in New England, New York, and New Jersey, although other regions hold shark tournaments as well. In 2004, the twenty-fourth Annual South Jersey Shark Tournament hosted over 200 boats and awarded over US$220 000 in prize money, with an entry fee of US$450 per boat. The "Mako Fever" tournament, sponsored by the Jersey Coast Shark Anglers, in 2004 awarded over US$55 000 in prizes, with the first place vessel receiving US$25 000. In 2004, the eighteen Annual Monster Shark Tournament in Martha's Vineyard, Massachusetts was broadcast on ESPN, and featured a new fishing boat valued at over US$130 000 awarded to the winner.

Status of sharks

In United States fisheries in 2007, three out of 12 shark stocks or stock complexes with a known overfishing status are listed as subject to overfishing (Table 1). Four out of ten shark stocks or stock complexes with a known overfished status are listed as overfished. Twenty-two and 24 shark stocks or stock complexes have an unknown or undefined status in terms of their overfishing and overfished status, respectively.

Domestic and international use

The primary United States domestic market for shark products is for meat, with the ex-vessel price (paid when offloaded) rarely exceeding over US$1.0 per 0.5 kg. However, the main driver of the commercial shark fishery is the demand for fins in foreign markets (except for spiny dogfish and skates). Top quality fins are regularly sold for over US$20 per pound (wet weight). In addition to direct consumption and production of shark products, net benefits from shark fisheries are also derived from the existence value of sharks for non- consumptive user groups (e.g. some people value knowing that sharks exist in the sea or value seeing sharks underwater). Although no quantitative estimates of existence value for sharks are available, it is likely very high given the fascination of the public with sharks (a similar estimate for sea turtles placed existence value at about US$8 billion).

The summaries of annual United States imports and exports of shark fins are based on information submitted by importers and exporters to the United States Customs and Border Protection and United States Census Bureau as reported in the NMFS Trade database. Exports of shark fins far exceed imports in both weight and value. The total weight and value of imports has increased every year since 2003. In 2006, the total weight of shark fin exports declined however the value increased compared to 2005. The vast majority of shark fins exported in 2006 were sent from the United States of America to China, Hong Kong SAR, Germany, Canada, and Japan, and small amounts were sent to Mexico and Netherlands. The mean value of fins per metric ton has been increasing since 2002, most notably in the China, Hong Kong SAR market. Mean values of dried shark fins for all countries combined has fluctuated between US$9 445/tonnes and US$84 211/tonnes from 2001 to 2006. China, Hong Kong SAR's significantly higher dollar value to quantity, as compared to shark fin trade with other countries, is associated with the higher quality demanded in China, Hong Kong SAR's inelastic market, and historically high consumption patterns.

National Plan of Action

The United States participated in the development of and endorsed the FAO's International Plan of Action (IPOA) for the Conservation and Management of Sharks. Consistent with the IPOA, the United Stated of America developed a National Plan of Action (NPOA) for the Conservation and Management of Sharks in February 2001.

2. DATA AVAILABILITY AND FISHERY MONITORING SYSTEMS

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) forms the basis for fisheries management in federal waters, and requires the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service to promulgate and enforce regulations. Shark fishery management in Federal waters of the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea (excluding dogfishes, skates, and rays) has been the responsibility of the Secretary of Commerce. Dogfish, skates, and rays in the Atlantic Ocean are managed by the New England Fishery Management Council (NEFMC), the Mid-Atlantic Fishery Management Council (MAFMC), the South Atlantic Fishery Management Council (SAFMC), the Gulf of Mexico Fishery Management Council (GMFMC), or the Caribbean Fishery Management Council (CFMC). In the Pacific, three regional councils are responsible for developing fishery management plans for sharks: the Pacific Fishery Management Council (PFMC), the North Pacific Fishery

Management Council (NPFMC), and the Western Pacific Fishery Management Council (WPFMC). The PFMC's area of jurisdiction is the EEZ off California, Oregon, and Washington; the NPFMC covers Federal

Table 1: Status of shark stocks and stock complexes in United States fisheries in 2007. Source: NMFS (2008)

Management plan	Stock or stock complex	Overfishing?	Overfished?
Spiny dogfish FMP NEFMC & MAFMC	Atlantic spiny dogfish	No	Undefined[1]
Consolidated Atlantic highly higratory species FMP — NMFS highly migratory species Division	Sandbar shark[2]	Yes	Yes
	Gulf of Mexico blacktip shark[3]	No	No
	Atlantic blacktip shark[3]	Unknown	Unknown
	Large coastal shark complex[4]	Unknown[5]	Unknown[5]
	Finetooth shark[6]	No	No
	Atlantic sharpnose shark[6]	No	No
	Blacknose shark[6]	Yes	Yes
	Bonnethead shark[6]	No	No
	Small coastal shark complex[7]	No	No
	Shortfin mako[8]	Unknown	Unknown
	Porbeagle shark[8]	No	Yes
	Blue shark[8]	Unknown	Unknown
	Dusky shark[9]	Yes	Yes
	Pelagic shark complex[10]	Unknown	Unknown
Pacific Coast groundfish FMP — PFMC	Leopard shark	Unknown	Unknown
	Soupfin shark	Unknown	Unknown
	Spiny dogfish	Unknown	Unknown
West coast highly migratory species FMP & Pelagic fisheries of the Western Pacific region FMP — PFMC & WPFMC	Common thresher – North Pacific	Unknown	Unknown
	Shortfin mako – North Pacific	Unknown	Unknown
	Blue shark – North Pacific	No	No
	Bigeye thresher shark – North Pacific	Unknown	Unknown
	Pelagic thresher shark – North Pacific	Unknown	Unknown
Pelagic fisheries of the Western Pacific region FMP — WPFMC	Longfin mako – North Pacific	Unknown	Unknown
	Oceanic white tip shark – Tropical Pacific	Unknown	Unknown
	Silky shark – Tropical Pacific	Unknown	Unknown
	Salmon shark – North Pacific	Unknown	Unknown

Coral reef ecosystems of the Western Pacific region — WPFMC	Coral reef ecosystem multi-species complex – Hawaiian Archipelago[11]	Unknown	Unknown
	Coral reef ecosystem multi-species complex – American Samoa[11]	Unknown	Unknown
	Coral reef ecosystem multi-species complex – Northern Mariana Islands[11]	Unknown	Unknown
	Coral reef ecosystem multi-species complex – Guam[11]	Unknown	Unknown
	Coral reef ecosystem multi-species complex – Pacific remote island areas[11]	Unknown	Unknown
Gulf of Alaska groundfish FMP — NPFMC	Other species complex[12]	Undefined	Undefined
BSAI groundfish FMP — NPFMC	Other species complex[13]	No	Undefined

Notes about Table 1:

[1] There is currently no definition contained in the spiny dogfish FMP to make a determination of overfished because there is no approved minimum biomass level; however, based on current NMFS recommended biomass threshold, the biomass estimates indicate the stock is not overfished.
[2] This stock is part of the large coastal shark complex, but is assessed separately.
[3] This stock is part of the large coastal shark Complex, but is assessed separately.
[4] In addition to sandbar shark, Gulf of Mexico blacktip shark, and Atlantic blacktip dhark, the large coastal shark complex also consists of additional stocks including spinner shark, silky shark, bull shark, tiger shark, lemon shark, nurse shark, scalloped hammerhead shark, Great hammerhead shark, and smooth hammerhead shark.
[5] External peer reviewer of the assessment felt it was unclear what exactly the results of the assessment represented, making it impossible to support the use of the results for management of the complex. While the previous stock assessment had concluded that the stock was subject to overfishing and overfished, the Panel stressed that results of previous assessments that used the same approach and similar data, perhaps of lesser quality, would attract the same kind of criticisms.
[6] This stock is part of the small coastal shark complex, but is assessed separately.
[7] The small coastal shark complex consists of four species: finetooth shark, Atlantic sharpnose shark, blacknose shark and bonnethead shark.
[8] These stocks are part of the pelagic shark complex, but are assessed separately. Assessments for blue shark and shortfin mako were conducted by the International Commission for the Conservation of Atlantic Tunas (ICCAT); the porbeagle shark assessment was conducted by Canada but results were deemed applicable for the United Stated of America since the stock is likely to be shared by both countries.
[9] Dusky sharks are a prohibited species and are assessed separately.
[10] In addition to shortfin mako, blue shark, and porbeagle shark, the pelagic shark complex also consists of oceanic whitetip shark and thresher shark. This complex also consists of stocks that cannot be retained in recreational or commercial fisheries, which include bigeye thresher shark, bigeye sixgill shark, longfin mako shark, sevengill shark and sixgill shark.
[11] This complex contains up to 146 “currently harvested coral reef taxa” [five of which are sharks (grey reef shark, silvertip shark, galapagos shark, blacktip reef shark, and whitetip reef shark)] and innumerable “potentially harvested coral reef taxa.”
[12] The other species complex consists of Pacific sleeper shark, salmon shark, spiny dogfish and numerous octopi, squid and sculpins.
[13] The other species complex consists of Pacific sleeper shark, salmon shark, spiny dogfish and numerous skates, octopi and sculpins.

waters off Alaska, including the Gulf of Alaska and the Bering Sea/Aleutian Islands; and the WPFMC's jurisdiction covers Federal waters around Hawaii, Guam, American Samoa, the Northern Mariana Islands, and other United States non-self governing insular areas of the Pacific.

Data collection and monitoring

The collection of United States commercial fisheries landings data is a joint state and federal responsibility. The cooperative State-Federal fishery data collection systems obtain landings data from state-mandated fishery trip-tickets, landing weigh-out reports provided by seafood dealers, federal vessel logbooks of fishery catch and effort, and shipboard and portside interview and biological sampling of catches. State fishery agencies are usually the primary collectors of landings data, but in some states NMFS and state personnel cooperatively collect the data. Survey methodology differs by state, but NMFS makes supplemental surveys to ensure that the data from different states and years are comparable.

For recreational fishing, the basic design for collecting fishing statistics consists of a complemented surveys approach that includes telephone surveys of fishing effort and an access-site intercept survey of angler catch. In the Atlantic, recreational harvest of sharks is obtained from the Marine Recreational Fishery Statistics Survey (MRFSS), the NMFS Headboat Survey, and the Large Pelagics Survey (LPS). In the Pacific, recreational harvest of sharks is also obtained from various surveys that are run by the different states (e.g. the California Recreational Fisheries Survey, the Oregon Department of Wildlife and Fisheries Ocean Recreational Boat Survey).

National Marine Fisheries Service also deploys fishery observers to collect catch and bycatch data from United States commercial fishing and processing vessels. Mandatory observers are required in many fisheries that target sharks or catch them as bycatch. All at sea observers are trained in fish identification and commonly record numbers and disposition as well as collect biological data. Depending on the program or design, observer coverage (as a percent of the total effort) can range from 1–2% to 100%. For example, Hawaii based pelagic longline vessels targeting swordfish require 100% coverage for shallow sets whereas the Atlantic Pelagic Longline Observer Program that places observers on United States flagged vessels in the northwest Atlantic Ocean, Gulf of Mexico and Caribbean Sea targets 8% coverage. The Atlantic shark research fishery has 100% observer coverage. Further information on the diversity of observer programs can be found at: http://www.st.nmfs.noaa.gov/st4/nop/index.html.

Regional fishery management organizations

The United States Government continues to work within regional fishery management organizations to facilitate shark research, monitoring, and management initiatives, as appropriate. The United States has successfully led efforts to ban shark finning and implement shark conservation and management measures within a number of such organizations in recent years such as the North Atlantic Fisheries Organization (NAFO), Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), International Commission for the Conservation of Atlantic Tunas (ICCAT), Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tunas Commission (IATTC).

Problems with data monitoring

Despite the array of data collection programs, limitations still exist in the monitoring of sharks catches. In some landings collection programs, sharks are still not recorded to species level and many catches are reported as "unclassified sharks" or "shark". However, in an attempt to improve quota monitoring, species-specific dealer reported information and overall data quality, workshops to train Federal Atlantic shark dealer permit holders or their proxies to properly identify shark carcasses have been recently implemented. These workshops are open to the public and enforcement officers often attend to aid in their identification skills.

Logbooks filled out by fishers also suffer from an occurrence of under-reporting and over-reporting of some shark species, and misidentification of species. For fishers whose first language is not English, the potential to misidentify and misuse generic words such as "brown shark" "white shark" or "blue shark" is very high. For example, "white shark" may not mean "*Carcharodon carcharias*" but rather, "white shark" means any shark that has large patches of white or is just lighter in color than sharks they more commonly caught (Burgess *et al.,* 2005). Fishers may also under-report bycatch over time as individuals develop a growing

perception that those reports result in increasingly restrictive management regimes (Cortés, Brown and Burkischer, 2007).

Observer programs likely collect the best data regarding species identification and the disposition of the catch and bycatch. However, observer programs are very expensive to implement resulting in low levels of coverage in some fisheries or a general lack of coverage in others. In recent years, the safety of the observer onboard the fishing vessel has resulted in a lack of coverage because the vessel was deemed unsuitable to carry an observer.

3. TRADE MONITORING

The United States of America collects general trade monitoring data through the United States Bureau of Customs and Border Protection (CBP; imports) and the US Bureau of the Census (Census Bureau; exports and imports). These programs collect data on the amount and value of imports and exports categorized under the Harmonized Tariff Schedule (HTS). Many species have distinct HTS codes, and some species are further subdivided by product (e.g. fresh or frozen, fillets, steaks, etc.). NMFS provides Census Bureau trade data for marine fish products online for the public at www.st.nmfs.gov/st1/trade/index.html. Some species, such as sharks, are grouped together, which can limit the value of these data for fisheries management when species-specific information is needed. These data are further limited since the ocean area of origin for each product is not distinguished. Export data for sharks is gathered by the Census Bureau, and includes trade data for sharks from any ocean area of origin. In 2008, National Marine Fisheries Service published a final rule that requires all shark fin importers and exporters in the United States to obtain a permit to aid in monitoring of the trade of shark fins (73 FR 31380). Shark exports are not categorized down to the species level, with the exception of dogfish, and are not identified by specific product code other than fresh or frozen meat and fins. Due to the popular trade in shark fins and their high relative value compared to shark meat, a specific HTS code was assigned to shark fins in 1998. It should be noted that there is no tracking of other shark products besides meat and fins. Therefore, NMFS cannot track trade in shark leather, oil, or shark cartilage products.

In addition to the HTS tariff number for commodities under its jurisdiction, the United States Food and Drug Administration requires product codes. An on-line system allows traders to create product codes to more specifically describe certain commodities. Codes can be created to identify shark generically for certain fish or seafood commodities.

The United States Fish and Wildlife Service (FWS) require a wildlife declaration to be filed with detailed species information as part of its import/export enforcement. HTS tariff numbers are flagged to identify commodities subject to FWS declaration requirements. United States Customs and Border Protection cannot release such shipments until the FWS requirements are satisfied. Because of the lack of specificity of some tariff numbers, it is not always clear which shipments require a FWS declaration. In such cases, the tariff numbers are subject to screening and targeting to find undeclared wildlife. A United States Government inter-agency import/export screening system is under development which will require traders to file either FWS-created product codes or certain data elements, including scientific name, with their customs entry in order to determine if a FWS declaration is required.

Identification of whole sharks in trade does not appear to present a problem to enforcement officers in the United States. Several identification manuals are used in different regions of the United States. USFWS Wildlife inspectors also use a variety of materials at the ports to identify live sharks and parts or derivatives, including identification materials distributed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and materials produced by State wildlife authorities. Inspectors also use on-line materials such as the Smithsonian guide to certain shark teeth,[1] the United States Food and Drug Administration Regulatory Fish Encyclopedia,[2] and the on-line guide created by California Fish and Game.[3] Parts and derivatives for human or animal consumption from sharks species not listed under CITES

[1] www.nmnh.si.edu/paleo/sharkteeth/index.html.
[2] www.cfsan.fda.gov/~frf/rfe0.html- limited for shark species.
[3] www.dfg.ca.gov/mrd/mspcont5.html.

are exempt from the USFWS import/export declaration process, although such specimens must be in compliance with State, other Federal, or foreign law.

DNA testing is used to identify shark species from parts or meat. Two federal labs conduct such forensic work, the United States Fish and Wildlife Service in Ashland, OR, and the NOAA forensic lab in Charleston, SC. The Guy Harvey Research Institute (e.g., Shivji *et al.,* 2002) has developed streamlined techniques for identification of many major commercially and CITES listed shark species including basking and white shark. No DNA marker is available for whale sharks; however, fins of these species can be identified by their unique patterns. Moreover, the development of a genetics primer to identify any smalltooth sawfish parts in trade is near completion.

References

Beerkircher, L.R., Brown, C.J., Abercrombie, D.L. and Lee, D.W. 2004. SEFSC Pelagic Observer Program Data Summary for 1992–2002. NOAA Technical Memorandum NMFS-SEFSC-522, 25p.

Burgess, G.H., Beerkircher, L.R., Cailliet, G.M., Carlson, J.K., Cortés, E., Goldman, K.J., Grubbs, R.D., Musick, J.A., Musyl, M.K. and Simpfendorfer, C.A. 2005. Is the collapse of shark populations in the Northwest Atlantic Ocean and Gulf of Mexico real? Fisheries 30:19–26.

Carlson, J.K. and Bethea, D.M. 2007. Catch and bycatch in the shark gillnet fishery: 2005-2006. NOAA Technical Memorandum NMFS-SEFSC-552. 26p.

Cortés, E., Brown C. and Beerkircher, L.R. 2007. Relative abundance of pelagic sharks in the western North Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea. Gulf Caribbean Research 19:37–52.

Dalzell, PJ., Laurs, R.M. and Haight, W.R. 2008. Case study: Catch and management of Pelagic Sharks in Hawaii and the US Western Pacific Region. Pp 268–273. In: Sharks of the Open Ocean Biology, Fisheries, and Conservation. (M.D. Camhi, E.K. Pikitch, and E.A. Babcock, eds). Blackwell Publishing Ltd.

Hale, L.F. and Carlson J.K. 2007 Characterization of the shark bottom longline fishery, 2005–2006. NOAA Technical Memorandum NMFS-SEFSC–554. 28p.

Holts, D.B., Juliana, A., Sosa-Nishizakib, O. and Bartoo, N.W. 1998. Pelagic shark fisheries along the west coast of the United States and Baja California, Mexico. Fisheries Research 39: 115–125.

NEFSC (Northeast Fisheries Science Center). 2000. [Report of the] 30th Northeast Regional Stock Assessment Workshop (30th SAW) Stock Assessment Review Committee (SARC) consensus summary of assessments. Northeast Fisheries Science Center Reference Doc 00–03. 477 p.

NEFSC (Northeast Fisheries Science Center). 2006. 43rd Northeast Regional Stock Assessment Workshop (43rd SAW): 43rd SAW assessment report. Northeast Fisheries Science Center Reference Doc 06–25. 400 p.

NMFS. 2007. Final Amendment 2 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. Public Document. pp. 726.

NMFS. 2008, Annual Report to Congress on the Status of US Fisheries-2007, US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Silver Spring, MD, 23 pp.

Shivji, M., Clarke, S., Pank, M. Natanson, L., Kohler, N. and Stanhope, M. 2002. Genetic Identification of Pelagic Shark Body Parts for Conservation and Trade Monitoring. Conservation Biology 16:1036–1047.

APPENDIX 8

Five years of implementation of the project: "Strengthening the Sub-regional Plan of Action for the Conservation and the Sustainable Management of Shark Populations within the "*Commission sous-régionale des pêches*" (CSP): outcomes and perspectives".

Mika Samba Diop
Coordinateur du projet PSRA-Requins,
CSRP, Dakar, Sénégal

Since 2004, the Sub-Regional Commission of Fisheries (CSRP), with the technical and financial support of the International Foundation of Banc d'Arguin (FIB) has been implementing the subregional Plan of Action for the conservation and the sustainable management of shark populations (PSRA-Requins). During the period 2004–2008, National Plans of Action for sharks (PAN-Requins) have been elaborated by six countries of the CSRP (Guinea Bissau; Cape Verde, Gambia; Guinea; Mauritania; Senegal) resulting in the improvement of our knowledge on shark populations and on their fisheries, including the economical and social aspects.

These results were obtained through the following actions:

- Training of the fishery observers and fishery biologists on species identification, methods to study the biology of shark (reproduction, growth) and to collect accurate fishery data;
- Development of a field guide for the identification of West African sharks and rays;
- Establishment of a network of fishery observers;
- Collection and analysis of fishery and socio-economical data;
- Evaluation of shark by-catch in industrial fisheries;
- Synthesis of national studies (SIAP: Système d'information et d'analyse des pêches);
- Study on the commercial networks of shark products;
- Description of the specialized landing sites;
- Description of the stakeholders involved in shark fisheries;
- Study of the migrations of fishing communities targeting sharks within the CSRP region;
- Updating the assessments of West African shark and ray species for IUCN Red List;
- Contribution to the elaboration of the proposal for the listing of sawfishes in CITES Appendix 1 (adopted at CoP 14, in 2007);
- Production of a video documentary on the origin and development of shark fisheries within CSRP region.

These actions allowed the understanding of the evolution of shark fisheries in all the CSRP countries.

In November 2007, a workshop was held in Dakar to evaluate the results of the project. The workshop concluded that:

- An important work has been done which significantly increased our knowledge on shark fisheries (description of the fisheries and the state of the exploited shark populations), and on the respective role of all stakeholders.
- The project strengthened the capacities and the skills of the fishery observers and biologists, managers and students involved in shark studies, thanks to the organisation of annual training seminars.
- The information provided by the scientists and fishery managers' show that most of the West African shark populations are overexploited. In some cases, even the litters of gravid females are exploited.
- The socio-economic data show that the shark fisheries are no longer profitable, but they are supported by "hidden" stakeholders involved in the shark fin market.
- The strong declines of shark populations caused the specialized fishermen to undertake long migrations, inducing important social and security problems.

- The implementation of some national plans of action (PAN-requins) is not satisfactory, as the measures are not strong enough to really modify the fishing practices. They should be reinforced to have a real impact.
- The status of most West African species has been evaluated for the IUCN Red List. For many species, the quantitative data are still not sufficient to provide an assessment, but the most common species are Near Threatened or even Endangered. However, no conservation measures have been taken in the subregion so far.
- The listing of all sawfish species in CITES Appendices was supported by the CSRP. But again, no regional regulation has been taken for these very vulnerable fishes close to extinction. Their distribution range in West Africa has strongly shrunk during the last decades and the sawfishes seem now restricted to the remote Bissagos archipelago. A project of a protected area in this archipelago (developed in collaboration with Noe Conservation) should help in the protection of the habitat of the remaining fish.

Based on these conclusions, the Workshop made the following recommendations:

1. creation of an West African observatory for sharks;
2. elaboration of pilot plans for the reconversion of the fishing communities, including the transformation of the shark products by the women;
3. standardization of management measures for shark fisheries within CSRP region;
4. development of research programmes to reduce the by-catch in industrial fisheries;
5. continuation of the series of training seminars for the fishery observers and biologists.

Since January 2008, the following actions have been undertaken:

1. Definition of pilot plans for the reconversion of specialized fishermen.
2. Definition of the aims of a West African shark observatory.
3. Definition of pilot plans for the reconversion of women involved in the shark products processing.

However, financial supports are needed to continue the actions already undertaken and to implement other actions in stand-by due to lack of means.

The Technical Workshop on the Status, Limitations and Opportunities for Improving the Monitoring of Shark Fisheries and Trade considered global and country specific information on shark fisheries and trade to identify limitations and strategies for improving their monitoring. Reports from a selected number of main shark fishing and trading nations described the status of shark fisheries and the efforts towards the development of a National Plan of Action for Sharks. The workshop recommended actions to promote the implementation of National Plans of Action for Sharks and to address specific problems affecting catch and trade monitoring, including lack specificity in data, underestimated catch volumes and limitations in the customs codes used in trade monitoring.

ISBN 978-92-5-106435-1 ISSN 2070-6987

9 789251 064351

I1121E/1/10.09/1350