

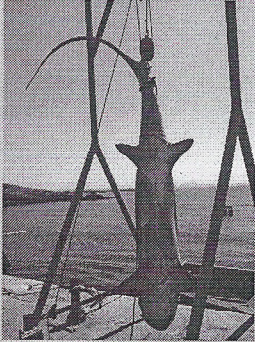
Pelagic sharks associated with swordfish and tuna fishery in the Mediterranean Sea

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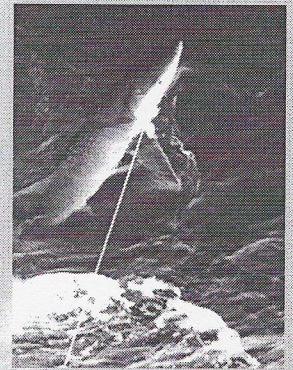
Introduction : Among marine fauna, sharks are one of the less well known groups both in terms of their biology and stock assessment. Sharks are slow-growing species with long reproductive cycles and there is concern that depleted populations cannot sustain heavy fishing mortality over many years. Moreover, as the status of shark stocks worldwide is generally unknown, there is concern that excessive removals of the top predators could have negative effects on predator-prey relationship in the marine ecosystem. Longlines as well other surface gears in large pelagic fisheries can result high by-catches rates and discards of many species of sharks.



Common thresher shark brought on board

- Objectives:**
1. Identify the extent of the incidence of the commercial large pelagic fisheries on the sharks and estimate the amount of shark species taken as by-catch
 2. Examine the disposition of the by-catch and analyze the causes of discarding
 3. Quantify the discarded sharks and to estimate the mortality rates caused
 4. Improve the knowledge on biology and stock state of the most important shark species

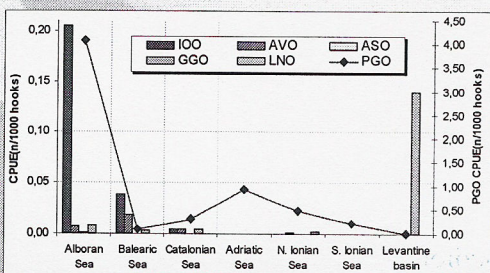
Materials & Methods : During the two year period 1998-1999 a shark sampling program has been established in Greece, Italy and Spain to improve the knowledge both on biology and stock structure of the most important pelagic shark species caught in the Mediterranean Sea by the tuna and swordfish fisheries. The incidence of these fisheries on sharks was studied in various vast areas of the Mediterranean Sea such as the Alboran, Balearic, Catalanian, Tyrrhenian, Adriatic, Ionian, Aegean Sea and Levantine basin. Catch and effort data as well as measurements and biological samples were collected both on board of professional fishing vessels and during the landings at selected pilot fishing ports of these three countries. Influence of environmental factors such as lunar phases and sea surface temperature was studied.



Blue shark caught on the longline

Results – Conclusions :

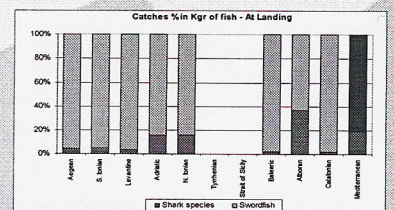
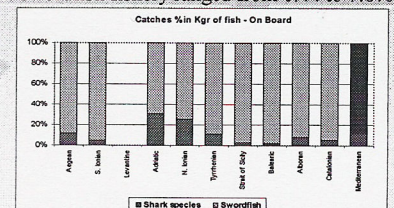
- At least 9 species of pelagic sharks were recorded in the by catch of the Mediterranean large pelagic fishery : blue shark, *Prionace glauca* (PGO), shortfin mako, *Isurus oxyrinchus* (IOO), common thresher shark, *Alopias vulpinus* (AVO), porbeagle, *Lamna nasus* (LNO), tope shark, *Galeorhinus galeus* (GGO), bigeye thresher shark, *Alopias superciliosus* (ASO), sandbar shark, *Carcharimus plumbeus* (CPO), sixgill shark, *Hexanchus griseus* (HGO) and smooth hammerhead, *Sphyrna zygaena* (SZO).
- Examining the geographical expansion of the nine shark species present in this study, only three of them showed up all over the Mediterranean: blue shark, common thresher shark and tope shark.
- The greater incidence of sharks occurred in the swordfish fishery. The incidence of sharks in the albacore longline fishery was almost negligible. In particular, their presence in the swordfish fishery catches reached higher percentages in the Alboran Sea (29% of the landings in 1998 and 20.1% in 1999) and Adriatic Sea (23.1% of the landings in 1999). Besides considering only the on board data, it was shown that shark by catches in the swordfish fishery ranged from 0.44 to 7.6% in the Spanish areas, from 1.82 to 4.9% in the Greek areas and from 0.7 to 39.7% in the Italian areas. It seems that sharks comprise a smaller proportion of landings in the Mediterranean than in other Atlantic longline fishing grounds.
- Fish with total length equal or less than 180 cm were estimated at 71,1% for blue shark, 94.6% for shortfin mako, 86.7% for porbeagle and 14.3% for the common thresher shark. Comparison among the blue shark catches of the three different gears examined showed that the albacore longline fish the smaller individuals whereas driftnets the larger ones. Actually, 87.5% of the albacore longline blue shark catches were juveniles with a total length (TL) equal or less than 120 cm. In contrary, the percentage of juveniles in the driftnet fishery and swordfish longline fishery reached only 1.8% and 6.8% respectively.



the eastern Atlantic. In the Mediterranean, higher values were found in the Alboran Sea reaching 4.3 sharks/1000 hooks.

CPUE (N°/1000 hooks) of the different shark species landed by swordfish longline during 1998 & 1999 in the Mediterranean Sea (note the different scale axis for blue shark at the right).

- CPUE data (No of sharks/1000 hooks) from the various investigated areas showed that Mediterranean long line catch rates were always lower than those in the eastern North Atlantic. According to Buencuerpo et. al. (1998), catch rates from the swordfish longline fleet ranged from 9.9 to 37.8 sharks/1000 hooks in

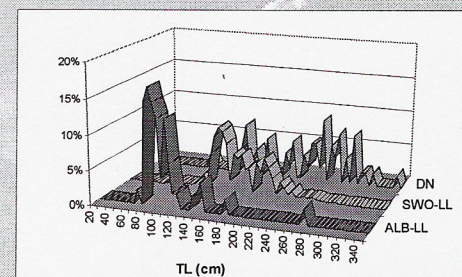
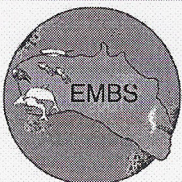


Relation between swordfish and shark catches in the swordfish longline fishery in the Mediterranean and per area investigated

- The observations carried out on board of vessels in the Mediterranean Sea let us assume that a high percentage of pelagic sharks caught by longlines, have a good chance of survival if discarded at sea because most of them are alive with good motility and combative behaviour when get on board of the fishing vessels.

Proposals - Recommendations :

- Ban of fining to all cartilaginous fishes
- Reduce the landing of juvenile fish. The establishment of a minimum size for any pelagic shark taken in the Mediterranean would also help to reduce juvenile mortality.
- Establish a minimum size of 180 cm total length for any blue shark landed or possessed for commercial purposes.
- Further research to identify and delineate the most important nursery grounds is needed.
- The blue shark could be chosen as the species to be used for analytical assessment in the Mediterranean because it is a pelagic species with a wide distribution in the area and data could be acquired from scientists working on sharks of the Atlantic Ocean.
- European Community and Mediterranean countries should invest in shark research and monitoring programs, which will provide critical data for shark fishery management.



Total length frequency distributions of blue shark caught by albacore longline (ALB-LL), swordfish longline (SWO-LL) and driftnets (DN)