

BY-CATCH OF SHARK SPECIES IN SURFACE GEAR USED BY THE ITALIAN FLEET FOR LARGE PELAGIC SPECIES

di Natale, A.¹

SUMMARY

The by-catch of shark species caught by the Italian fleet during the large pelagic fishing season in the Mediterranean Sea is still to be assessed and monitored, due to the lack of data in the last decade.

The only available recent information is related to the by-catch by driftnets and longlines used for the swordfish fishery in some Mediterranean basins (Ligurian Sea, Tyrrhenian Sea, Straits of Sicily), obtained during the last observer program in 1991-92.

The number of species and the quantities of some of these could reach significant values, but the impact on the wild populations and the trends are still to be assessed.

The next observers program for the Italian longline fishery should begin in 1998, financed by the Italian Direction General of Fisheries and Aquaculture, for the purpose of obtaining a first assessment of by-catch.

RÉSUMÉ

La prise accessoire de requins capturés par la flottille italienne pendant la saison de pêche des grands pélagiques dans la Méditerranée est toujours quelque chose à évaluer et à suivre, en raison du manque de données des dernières décennies.

La seule information récente disponible est relative à la prise accessoire par filets maillants et palangres utilisés pour la pêche d'espadon dans certains bassins méditerranéens (Mer Ligure, Mer Tyrrhénienne, Détroits de Sicile), obtenue durant le dernier programme d'observateurs en 1991-1992.

Le nombre d'espèces et la quantité de certaines d'entre elles pourraient atteindre des valeurs significatives, mais l'impact sur les populations d'espèces sauvages et les tendances restent encore à évaluer.

Un nouveau programme d'observateurs pour la pêche palangrière italienne devrait commencer en 1998, financé par la Direzione Generale della Pesca e dell'Acquacoltura, dans le but d'obtenir une première évaluation de la prise accessoire.

RESUMEN

Aún está por evaluar y hacer un seguimiento de la captura secundaria de especies de tiburones capturados por la flota italiana durante la estación de pesca de grandes pelágicos en el Mediterráneo, debido a la falta de datos en las últimas décadas.

La única información reciente disponible se relaciona con la captura secundaria con redes de deriva y palangres utilizados para la pesquería de pez espada en algunas cuencas mediterráneas (mar de Liguria, mar Tirreno, Estrechos de Sicilia), obtenida durante el último programa de observadores en 1991-92.

El número de especies y las cantidades de algunas de ellas podrían alcanzar valores significativos, pero aún está por evaluar el impacto sobre las poblaciones salvajes y las tendencias.

En 1998 debería iniciarse un nuevo programa de observadores para la pesquería de palangre italiana, concedido por la Dirección General de Pesquerías y Acuicultura de Italia, con el objetivo de obtener una primera evaluación de la captura secundaria.

¹ Aquastudio, Via Trapani no. 6, 98121 Messina, Italia.

INTRODUCTION

In the last decades, an important surface gear fishery on large pelagic species has been developed in several Mediterranean Countries. In Italy, where this fishery is traditional, the fleet became important, as reported in several previous papers (Di Natale *et al.*, 1992), using driftnets, long-lines, purse-seines and harpoons.

Several data series have been collected on target species, while, on the opposite, data on by-catch are occasionally taken (De Metro *et al.*, 1984). As a matter of fact, most of the by-catch data are related to protected species (turtles and cetaceans) and only the few observers data sets are all inclusive.

The impact of these fishing activities on sharks is a problem recently raised in international fora, but it seems that this impact has not been considered at all till the last year. The evidence of a general decreasing in shark populations is clear, but its scientific evidence is not at all, mainly due to the lack of any historical series of catches. The attention to the highest level of the marine trophic chain must be clear, because any possible decreasing of predators could result in several impacts on commercial target species, namely a higher diffusion of fish diseases or parasites and possible changes at any level in the trophic chain.

The only possible way to collect data on the by-catch is to carry out regular observers programmes, which are extremely expensive. In Italy, an observers programme was conducted in 1991 and 1992, particularly targeting on the driftnet fishery, but with observers trips even on longliners. Several data have been reported on various papers (Di Natale *et al.*, 1990, 1991, 1995; Northridge, 1992; Northridge *et al.*, 1991, Northridge and Di Natale, 1991), mostly dealing with target or protected species, but data on sharks were still to be published, as well as more recent catch data, collected during 1995 and 1996 fishing seasons.

METHODS

As above reported, the main source of data has been an observers programme, carried out by our Institute from November 1990 to April 1992, in the Ligurian Sea in the Ligurian Sea and in the Strait of Sicily, with a grant by the Directorate General for Fishery and Aquaculture (Italian Ministry of Agriculture Policy).

A total of 100 (35 in the Ligurian Sea and 65 in the Tyrrhenian Sea) commercial trips on swordfish driftnet vessels were monitored by our observers on board, as well as 25 commercial trips on swordfish long-line vessels. All the catches have been directly checked and reported in detail on a 4-page form; the environment information was also included (Di Natale *et al.*, 1992).

Catch data and the following estimation have been obtained during the last landing monitoring programme, carried out in 1994 and 1995, in the Tyrrhenian Sea and in the Strait of Sicily, still with a grant by the Direction General for Fishery and Aquaculture (Italian Ministry of Agriculture Policy).

DISCUSSION

A broad list of shark species reported so far in the by-catch of the Italian large pelagic fishery is available from a previous comprehensive report (Di Natale *et al.*, 1992) and it is here following summarised:

Species	Scientific name	Gear			
		GILL	LL	PS	HARP
SHARKS					
Thresher shark	<i>Alopias vulpinus</i>	X	X		X
Bigeye Thresher shark	<i>Alopias superciliosus</i>	X	X		
Copper shark	<i>Carcharhinus brachyurus</i>	X			
Spinner shark	<i>Carcharhinus brevipinna</i>	X	X		
Silky shark	<i>Carcharhinus falciformis</i>	X			
Blacktip shark	<i>Carcharhinus limbatus</i>	X	X		
Dusky shark	<i>Carcharhinus obscurus</i>	X	X		
Sandbar shark	<i>Carcharhinus plumbeus</i>	X	X		
Blue shark	<i>Prionace glauca</i>	X	X	X	X
Basking shark	<i>Cetorhynchus maximus</i>	X	X		X
Sharpnose seven-gill shark	<i>Heptranchias perlo</i>	X	X		
Bluntnose six-gill shark	<i>Hexanchus griseus</i>		X		
Great white shark	<i>Carcharodon carcharias</i>	X	X		X
Shortfin mako	<i>Isurus oxyrinchus</i>	X	X		X
Portbeagle	<i>Lamna nasus</i>	X	X		X
Sand tiger shark	<i>Eugomphodus taurus</i>	X	X		X
Smalltooth sand shark	<i>Odontaspis ferox</i>	X	X		X
Smooth hammerhead	<i>Sphyrna zygaena</i>	X	X		X
Scalloped hammerhead	<i>Sphyrna lewini</i>	X			
Great hammerhead	<i>Sphyrna mokkaran</i>		X		
Hammerhead	<i>Sphyrna sp.</i>	X	X		
Spurdog	<i>Squalus acanthias</i>		X		
Longnose spurdog	<i>Squalus blainvillei</i>		X		
Tope shark	<i>Galeorhinus galeus</i>	X	X		
Starry smooth-hound	<i>Mustelus asterias</i>	X			
Smooth-hound	<i>Mustelus mustelus</i>		X		X
OTHER SELACHII					
Shagreen ray	<i>Raja fullonica</i>		X		
Violet stingray	<i>Dasyatis violacea</i>	X	X		X
Common eagle ray	<i>Myliobatis aquila</i>	X	X		
Bull ray	<i>Pseudomyliobatis bovinus</i>	X	X		
Devil ray	<i>Mobula mobular</i>	X	X	X	X

As concern the observers programme on board of driftnet vessels (GILL), only five species have been recorded in the by-catch, with a difference between the northern part of the basin (Ligurian Sea) and the southern basins (central and southern Tyrrhenian Sea), as showed in the following list:

Species	Scientific name	Area					
		Total		Ligurian Sea		Tyrrhenian Sea	
		number	%	number	%	number	%
SHARKS							
Thresher shark	<i>Alopias vulpinus</i>	4	0.21	4	0.32	-	-
Blue shark	<i>Prionace glauca</i>	8	0.43	3	0.24	6	0.98
Basking shark	<i>Cetorhynchus maximus</i>	1	0.05	1	0.08	-	-
OTHER SELACHII							
Violet stingray	<i>Dasyatis violacea</i>	19	1.02	1	0.08	18	2.93
Devil ray	<i>Mobula mobular</i>	8	0.43	8	0.64	-	-

The CPUE in number of specimen in the area was of 0.005/km for the Thresher shark, 0.009/km for the Blue shark, 0.001/km for the Basking shark, 0.022/km for the Violet stingray and 0.005/km for the Devil ray.

Important differences in the by-catch rate have been sometimes reported by the observers, by comparing the catches on the vessel carrying the observer and the landings by other vessels. This fact confirms the well known incidentally of the catches obtained by this gear.

Only a few species are usually marketed by the driftnet fishermen: Thresher sharks, Shortfin mako and Portbeagle, while other species (Blue sharks, Great white sharks, Sharpnose seven-gill sharks, Bluntnose six-gill sharks, Starry smooth-hounds, Hammerhead sharks) are sometimes marketed, whole or sectioned. Anyway, most of the shark species and all the rays are usually rejected at sea.

As concerns the observers pilot programme on board of long-line vessels, conducted during a very short period in 1991, only four species have been recorded in the by-catch, as showed in the following list:

Species	Scientific name	Area	
		Tyrrhenian Sea and Straits of Sicily number	%
SHARKS			
Shortfin mako	<i>Isurus oxyrinchus</i>	2	0.68
Blue shark	<i>Prionace glauca</i>	14	4.74
Smooth hammerhead	<i>Sphyrna zygaena</i>	1	0.34
OTHER SELACHII			
Violet stingray	<i>Dasyatis violacea</i>	27	9.15

The CPUE in number of specimen in the area was of 0.051/km for the Shortfin mako, 0.358/km for the Blue shark, 0.026/km for the Smooth hammerhead and 0.691/km for the Violet stingray. The fishermen confirm a high variability in the quantities, according to the seasonality, the climatology and the fishing areas, always related to the species.

Even for the long-line by-catch, a large part of the catches is not marketed and often released alive at sea, even before taking the specimens on board, by cutting the line; this fact is much more relevant in the off-shore fishing activity, when trips are very long (sometimes over 25 days), with the exception of the last fishing days.

The violet stingray is not usually marketed, as well as all the other rays, while, on the contrary, a few species are usually marketed by the long-line fishermen (Thresher sharks, Shortfin mako and Portbeagle) and other species (Blue sharks, Carcharhinus species, Great white sharks, Spundogs, Sharpnose seven-gill sharks, Bluntnose six-gill sharks, Smooth-hounds, Hammerhead sharks) are sometimes marketed, whole or sectioned (gutted, head off, tail off, or skin off).

A port landings monitoring programme has been carried out in 1994 and 1995 (Di Natale et al., 1996), by a weekly control in several sampling ports: Ponza, Lipari and Sant'Agata Militello (central and southern Tyrrhenian Sea) for the driftnet fishing, and Ponza, Lipari, Marsala and Mazara del Vallo (central and southern Tyrrhenian Sea, Straits of Sicily) for the long-line fishing. The programme was originally devoted only to the target species (bluefin tuna, albacore and swordfish), as requested by the Ministry of Agriculture Policy, but even all the other commercial species have been systematically recorded by our researchers.

The port landing data have been used for the extrapolation, with the purpose to obtain a first estimation and assessment of the catches in the areas (central and southern Tyrrhenian Sea and Straits of Sicily) for the two fisheries. As a consequence of the methodology adopted, only the few shark species landed in the sampling ports in 1994 and 1995 have been assessed per gear, as showed here following (the estimated number of specimens is reported in brackets):

Species	Scientific name	Area			
		Central & Southern Tyrrhenian Sea and Strait of Sicily tons (GWT)		number	
Gear: driftnet (GILL)		1994	1995	1994	1995
Thresher shark	<i>Alopias vulpinus</i>	4.4	117	38	998
Blue shark	<i>Prionace glauca</i>	17	29	463	587
Portbeagle	<i>Lamna nasus</i>	-	17	-	448
Gear: long-line (LL)					
Thresher shark	<i>Alopias vulpinus</i>	1	4	9	34
Blue shark	<i>Prionace glauca</i>	80	157	2160	3190
Shortfin mako	<i>Isurus oxyrinchus</i>	5	9	127	212

The comparison between observed catches (in 1990 and 1991) and landings (in 1994 and 1995) doesn't show any great difference in species composition, except for the species which are not usually landed or marketed.

Then, it seems that most of the species reported in the first list should be only occasionally or incidentally taken but, at the same time, the absence of some species reported by observers on board and not landed shows in a clear manner the importance of establishing an observers monitoring programme, with the purpose to better assess the impact of each gear on the various shark species.

It is also clear that it should be necessary to recover and organise all the shark data included in previous large pelagic fishery reports, with the purpose to try to reconstruct historical catch series, even with holes, to better understand possible trends.

CONCLUSIONS

From the above reported data, which are related only to some Italian basins, it is evident that the effort to collect shark by-catch data from the large pelagic fishery should be highly implemented in the future, due to the possible impact of these fisheries on some shark species and to the related possible consequences on the marine food chain.

The available data only shows a great yearly fluctuation in landings and a discrepancy in species composition between by-catch and landings, particularly relevant for all the species not usually marketed.

Even if most of the shark species are not traditionally eaten by the Italian consumers, shark meat consumption is increasing, often by masking the offer through unusual commercial names (Laurenti and Rocco, 1996).

Of course, the data available from the most recent research programmes are greatly related to the most important target species (bluefin tuna, albacore and swordfish), with the consequence to be useless for any assessment of national shark landings or catches.

A next observers programme on board of long-line vessels, funded by the Italian Direction General for Fishery and Aquaculture should begin to partially improve the actual situation.

ACKNOWLEDGEMENTS

The Author wishes to thank all the biologist and technicians belonging to Aquastudio for the great effort they have done to recover all the available data, often waiting for nights and nights in the wet on the docks.

A particular thank is due to the Ministry of Agriculture Policy and to the Director General for Fishery and Aquaculture, Dr. Giuseppe Ambrosio, for the financial support given to the previous research.

BIBLIOGRAPHY

DE METRIO G., G. Petrosino, C. Montanaro, A. Matarrese, M. Lenti, E. Cecere, 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 swordfish (*Xiphias gladius* L.) and Albacore (*Thunnus alalunga* Bonn.) fishing. OEBALIA, vol. X, n.s.:105-116.

DI NATALE, A., F. Andaloro, A. Mangano, A. Pederzoli, 1990. Rapporto sulla pesca in Italia. W.W.F. Italia, Serie Atti e Studi, 7: 75 p.

DI NATALE, A., L. Labanchi, A. Mangano, A. Maurizi, L. Montaldo, O. Montebello., E. Navarra., A. Pederzoli, S. Pinca, V. Placenti, O. Schimmenti, E. Sieni, G. Torchia, M. Valastro, 1992. Gli attrezzi pelagici utilizzati per la cattura del pescespada (*Xiphias gladius* L.) adulto: valutazione comparata della funzionalità, della capacità di cattura, dell'impatto globale e della economia dei sistemi e della riconversione. Report to: Ministero della Marina Mercantile, Direzione Generale Pesca Marittima, Roma: 350 p.

DI NATALE, A., A. Mangano, A. Maurizi, L. Montaldo, E. Navarra., S. Pinca, O. Schimmenti, G. Torchia, M. Valastro, 1995. A review of driftnet catches by the Italian fleet: species composition, observers data and distribution along the net. Third GFCM/ICCAT Expert Consultation on Evaluation of Stocks of Large Pelagic Fishes in the Mediterranean Area. (Fuengirola, Spain, September 19-24, 1994). ICCAT, Coll. Vol. Sci. Pap.

DI NATALE, A., A. Mangano, E. Navarra., M. Valastro, A. Asaro, M. Bascone., 1996. Osservazioni sulla pesca dei grandi Scombroidei nei Bacini Tirrenici e dello Stretto di Sicilia. Report to: Ministero delle Risorse Agricole, Alimentari e Forestali, Direzione Generale Pesca ed Acquacoltura, Roma: 379 p.

LAURENTI, A. and M. Rocco, 1996 - Indagine sul commercio degli Elasmobranchi: la situazione italiana. Report to: TRAFFIC Europe, Italy Office, Roma: 42 p.

NORTHRIDGE, S., 1992. La peche aux filets dérivants et son impact sur les espèces non visées: étude mondiale. FAO Fish. Tech. Pap.: 320 p.

NORTHRIDGE, S. and A. Di Natale, 1991. The environmental effects of fisheries in the Mediterranean. Report to: European Commission's Directorate General for the Environment, Nuclear Safety and Civil Protection, Bruxelles: 44 pp.

NORTHRIDGE, S., A. Di Natale, C. Kinze, K. Lankaster, V. Ortiz de Zarate, 1991. Gillnet fisheries in the European Community and their impacts on the marine environment. Report to: European Commission's Directorate General for the Environment, Nuclear Safety and Civil Protection, Bruxelles: 95 pp.