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SHARKS CAPTURED OFF PESCARA (ITALY, WESTERN ADRIATIC SEA)

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ABSTRACT

*We present the results of a study of sharks captured in the waters off Pescara, Italy (Adriatic Sea), from May 2000 to March 2003. We recorded 144 sharks, representing at least 11 species: houndsharks (*Mustelus *sp. and maybe* Leptocharias smithii, *29.86% of total captures), catsharks (*Scyliorhinus canicula, S. stellaris *and* S. *sp., 28.47%),* Squalus acanthias *(24.30%),* Hexanchus griseus *(5.55%),* Prionace glauca *(4.86%),* Lamna nasus *(2.77%),* Cetorhinus maximus *(2.08%),* Alopias vulpinus *(0.69%),* Oxynotus centrina *(0.69%) and* Centrophorus sp. *(0.69%). We also had the opportunity to gather information concerning some captures of* P. glauca, A. vulpinus, Carcharodon carcharias *and unidentified lamnid sharks that had occurred in previous years. In these waters,* H. griseus *appears to be relatively abundant and* L. nasus *is more common than previously believed; the paucity of captures of* P. glauca *may present cause for concern.*

Key words: sharks, fishery, Italy, Adriatic Sea, Mediterranean Sea

GLI SQUALI CATTURATI NELLE ACQUE DI PESCARA (ITALIA, MARE ADRIATICO OCCIDENTALE)

SINTESI

*Vengono presentati i risultati di uno studio degli squali pescati nelle acque di Pescara, Italia (Mare Adriatico), dal Maggio 2000 al Marzo 2003. Sono stati registrati 144 esemplari, riferibili ad almeno 11 specie: palombi (*Mustelus sp. e forse Leptocharias smithii, *29.86% delle catture totali), gattucci (*Scyliorhinus canicula, S. stellaris e S. sp., *28.47%),* Squalus acanthias *(24.30%),* Hexanchus griseus *(5.55%),* Prionace glauca *(4.86%),* Lamna nasus *(2.77%),* Cetorhinus maximus *(2.08%),* Alopias vulpinus *(0.69%),* Oxynotus centrina *(0.69%) e* Centrophorus sp. *(0.69%). E' stato inoltre possibile rilevare informazioni inerenti ad alcune catture di* P. glauca, A. vulpinus, Carcharodon carcharias *e lamnidi non identificati occorse in anni precedenti. In queste acque* H. griseus *appare relativamente frequente e* L. nasus *è più comune di quanto si ritenesse; è preoccupante l'esiguità di catture di* P. glauca.

Parole chiave: squali, pesca, Italia, Mare Adriatico, Mare Mediterraneo

INTRODUCTION

The capture of sharks, mostly as by-catch, along the Italian coast has only rarely been the object of specific and long-term analysis (De Maddalena & Piscitelli, 2001). However, such studies are an important source of data that, correctly interpreted, allow us to significantly increase our knowledge of sharks inhabiting the Mediterranean Sea. Such an investigation permits us to gather fundamental information on occurrence, distribution, relative abundance and fisheries status of many shark species. For these reasons, a study of the sharks captured in the waters off Pescara, Abruzzi, Italy (Western Adriatic Sea), an area where shark fauna have previously been only infrequently and irregularly investigated, has been conducted over a three-year period.

MATERIAL AND METHODS

This study commenced in May 2000 and is still in progress, the results presented herein are those obtained through March 2003. This program is among the various regional initiatives that began following the formation of the Mediterranean Shark Research Group (MSRG), of which both authors are members. This study has been conducted primarily through periodic examination of the fish brought to Pescara Fish Market and by maintaining contacts with the veterinary staff and the fishermen working with that organization. Through these contacts many specimens observed by the Fish Market staff were added to those that were personally examined by one of the authors (G. C.). Additionally, we actively solicited the collaboration and participation of sport fishermen in the study area. Whenever possible, the following data were collected for each specimen: species, size, sex, location and date of capture. In some cases, it was also possible to collect photographic or filmed evidence of the specimens. Other additional data, such as weight of the specimen and distance from the coast, were only rarely collected.

The size of each shark was recorded as total length (TOT) measured as a straight line extending from the tip of the snout to the tip of the upper lobe of caudal fin, with the caudal fin in the depressed position, which is also the maximum length (Compagno, 1984). The classification we followed is that of Compagno (1984).

RESULTS

During the study period we recorded 144 sharks, representing at least 11 species, 9 families and 4 orders. These were: order Hexanchiformes: bluntnose sixgill shark, *Hexanchus griseus* (n=8) (family Hexanchidae); order Squaliformes: gulper shark, *Centrophorus sp.* (n=1), piked dogfish, *Squalus acanthias* (n=35) (family Squalidae), angular roughshark, *Oxynotus centrina* (n=1) (family Oxynotidae); order Lamniformes: common thresher shark, *Alopias vulpinus* (n=1) (family Alopiidae), basking shark, *Cetorhinus maximus* (n=3) (family Cetorhinidae), porbeagle, *Lamna nasus* (n=4) (family Lamnidae); order Carcharhiniformes: small-spotted catshark *Scyliorhinus canicula* (n=20), nursehound, *Scyliorhinus stellaris* (n=1) (family Scyliorhinidae), barbeled houndshark, *Leptocharias smithii* (n=2)(family Leptochariidae) (but the species identification is not confirmed), smooth-hound, *Mustelus sp.* (n=41) (family Triakidae) and blue shark, *Prionace glauca* (n=7)(family Carcharhinidae).

Capture locations were primarily in the waters off Pescara, some additional captures occurred in the waters of such nearby localities as Giulianova (35 km north of Pescara), Silvi Marina (10 km north of Pescara) and Ortona (16 km south of Pescara) (Fig. 1).

The data collected are presented in Tab. 1. For each specimen, the following data are reported: species, number of specimens (No.), capture date, capture location, sex (M or F), total length in cm, data source (when not directly collected by G. C.) and additional notes.

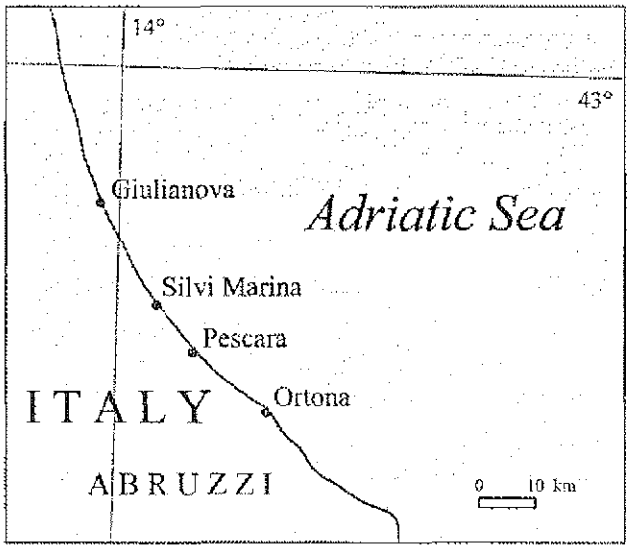

Fig. 1: Area of Pescara, Italy, on the Western Adriatic Sea coast. (Drawing: A. De Maddalena).
Sl. 1: Območje Pescare, Italija, na zahodni jadranski obali. (Risba: A. De Maddalena).

Tab. 1: Sharks captures off Pescara (Italy, Western Adriatic Sea) recorded during the study period (May 2000 – March 2003).

Tab. 1: Morski psi, ujeti v vodah blizu Pescare (Italija, zahodni Jadran) in zabeleženi v preučevanem obdobju (maj 2000 – marec 2003).

SPECIES	No.	DATE	LOCA-TION	SEX	TOTAL LENGTH (cm)	SOURCE	NOTES
Prionace glauca	1	May 2000	Pescara	-	275		Photographed.
Prionace glauca	2	Summer 2000	Pescara	-	ca. 200		Caught by sport-fishermen.
Lamna nasus	1	Summer 2000	Pescara	-	<200		Caught by sport-fishermen.
Prionace glauca	1	August 2000	Ortona	-	150		Photographed.
Oxynotus centrina	1	October 2000	Pescara	F	50-60	F. Lodi *(pers. comm.)*	Pregnant, carrying 5 embryos.
Cetorhinus maximus	1	End of November 2000	Pescara	-	500	F. Lodi *(pers. comm.)*	Landed already cut in pieces.
Leptocharias smithii (?)	2	April 26th 2001	Pescara	-	ca. 100		Black-spotted coloration. The species identification is doubtful.
Lamna nasus	1	May 8th 2001	Pescara	M	ca. 150		Weight: 35 kg.
Squalus acanthias	1	May 2001	Pescara	F	ca. 70		
Alopias vulpinus	1	June 2001	Pescara	-	350	E. Ballone *(pers. comm.)*	
Scyliorhinus sp.	20 ca.	July 2001	Pescara	M & F	-		
Cetorhinus maximus	1	November 2001	Pescara	-	500		Caught by fishing vessel "Nausicaa". Photographed.
Lamna nasus	1	December 2001	Pescara	F	ca. 250		Filmed. Total length estimated from the video.
Cetorhinus maximus	1	December 20th 2001	Pescara	-	700		Filmed (Fig. 2).
Mustelus sp.	1	Mid January 2002	Pescara	M	120		Black-spotted coloration. Photo-graphed.
Hexanchus griseus	1	January 22nd 2002	Pescara	F	350		Photographed (Fig. 3).
Hexanchus griseus	1	January 22nd 2002	Pescara	M	-		
Lamna nasus	1	February-March 2002	Giulianova	-	180	"Remo" *(pers. comm.)*	Caught by fisherman "Remo".
Scyliorhinus canicula	20 ca.	18th April 2002	Pescara	-	-		
Scyliorhinus stellaris	1	23rd April 2002	Pescara	-	ca. 120		
Centrophorus sp.	1	23rd April 2002	Pescara	-	ca. 100		
Prionace glauca	1	11th July 2002	Pescara	-	ca. 350		Caught about 20 miles offshore. Photographed (Fig. 4).
Prionace glauca	1	21st July 2002	Giulianova	-	150	"Remo" *(pers. comm.)*	Caught by fisherman "Remo".
Prionace glauca	1	21st July 2002	Giulianova	-	240		
Hexanchus griseus	1	28th August 2002	Pescara	-	ca. 100		Weight: 80 kg.
Hexanchus griseus	1	25th September 2002	Pescara	-	ca. 170		
Mustelus sp.	8	3rd October 2002	Pescara	F	100 to 120		Caught inshore.
Hexanchus griseus	1	10th October 2002	Pescara	F	ca. 450-500		
Mustelus sp.	3	14th November 2002	Pescara	F	ca. 100		
Hexanchus griseus	1	19th November 2002	Pescara	-	200		
Squalus acanthias	1	3rd December 2002	Pescara	F	ca. 100		
Mustelus sp.	1	3rd December 2002	Pescara	F	50		
Squalus acanthias	1	9th January 2003	Pescara	F	ca. 120		Caught about 10 miles offshore.
Squalus acanthias	2	9th January 2003	Pescara	-	-		Caught about 10 miles offshore.
Mustelus sp.	4	9th January 2003	Pescara	-	-		Caught about 10 miles offshore.
Squalus acanthias	30	16th January 2003	Pescara	-	-		Caught offshore.
Mustelus sp.	1	16th January 2003	Pescara	F	120		Black-spotted coloration.
Hexanchus griseus	1	23rd January 2003	Pescara	-	ca. 200		Landed already cut in pieces.
Hexanchus griseus	1	25th February 2003	Pescara	-	ca. 200		Landed already cut in pieces.
Mustelus sp.	1	26th February 2003	Pescara	-	ca. 150		Weight: over 15 kg.
Mustelus sp.	20	27th February 2003	Pescara	-	ca. 50		Caught inshore.
Mustelus sp.	2	6th March 2003	Pescara	-	ca. 120		

Tab. 2: Additional shark captures recorded during the study for the species that had occurred off Pescara, Giulianova and Silvi Marina in previous years.
Tab. 2: Morski psi, ki so se pojavljali v vodah v bližini Pescare, Giulianove in Silvi Marine v letih pred preučevanim obdobjem.

SPECIES	No.	DATE	LOCATION	SEX	TOTAL LENGTH (cms)	SOURCE	NOTES
Carcharodon carcharias	1	Around 1945	Pescara	-	ca. 600	V. Pomante *(pers. comm.)*	Caught by fisherman Vittorio Pomante.
Isurus oxyrinchus or *Lamna nasus*	3	1958	Pescara	-	-	V. Pomante *(pers. comm.)*	Caught within a week by fisherman Vittorio Pomante.
Alopias vulpinus	1	1987	Giulianova	-	600	"Remo" *(pers. comm.)*	Caught by fisherman "Remo".
Prionace glauca	1	1995	Giulianova	-	340	"Remo" *(pers. comm.)*	Caught by fisherman "Remo".
Alopias vulpinus	1	1997	Silvi Marina	-	416		Caught by sportfishermen. Photographed.
Prionace glauca	1	1999	Silvi Marina	-	270		Caught by sportfishermen. Photographed.
Alopias vulpinus	1	Summer 1999	Pescara	-	ca.300		Caught by sportfishermen.
Alopias vulpinus	1	2000	Silvi Marina	-	330		Caught by sportfishermen. Photographed.

While we collected data on sharks captured during this study period, we also had the opportunity to gather information concerning some captures that had occurred in previous years in the waters off Pescara, Giulianova and Silvi Marina. These captures included members of the following species: blue shark, *Prionace glauca*, common thresher shark, *Alopias vulpinus*, white shark, *Carcharodon carcharias*, as well as other lamnid sharks not clearly identified but possibly either shortfin mako, *Isurus oxyrinchus* or porbeagle, *Lamna nasus*. These additional data are presented in Tab. 2.

DISCUSSION

The number of sharks captured off Pescara from May 2000 to March 2003 and the percentage of each species of the total shark captures are presented in Tab. 3.

The most abundant sharks in the area off Pescara are those of small and medium size: *Mustelus sp.* (28.47% of total captures), the catsharks *(Scyliorhinus canicula, S. stellaris* and *S. sp.*, 28.47%) and *Squalus acanthias* (24.30%). Large sharks are less abundant: *Hexanchus griseus* (5.55%), *Prionace glauca* (4.86%), *Lamna nasus* (2.77%), *Cetorhinus maximus* (2.08%) (Fig. 2), *Alopias vulpinus* (0.69%). Our data suggest that the rarest species in the area are *Oxynotus centrina* (0.69%) and *Centrophorus sp.* (0.69%). Two specimens were initially identified as *Leptocharias smithii*, but a subsequent inquiry suggests that the species identification is doubtful. Therefore, the presence of *L. smithii* in the Adriatic Sea should be regarded as doubtful and requiring further investigation. We note that in this zone, as observed along other parts of the Italian coast (A. De Maddalena, *unpubl. data*), *H. griseus* appears to be relatively abundant, despite the fact that it is a species of conspicuous size. The paucity of captures of *P. glauca* observed in this study may present cause for concern for this species, since it is usually considered to be the most common large shark by far in the Western Adriatic. We also draw attention to the four captures of *L. nasus*. Recently, Marconi & De Maddalena (2001) reported the capture of a young, 91 cm female porbeagle that occurred off San Benedetto del Tronto (60 km North of Pescara) in July 2001, while this study was being conducted. It is very interesting to note that all these captures occurred within a relatively small area, since the porbeagle has usually been described as particularly rare in the Adriatic Sea (Tortonese, 1956; Pallaoro & Jardas, 1996; Soldo & Jardas, 2002; L. Lipej, *pers. comm.*; A. Soldo, *pers. comm.*). It is evident that in this area *L. nasus* is at present surely more common than previously believed.

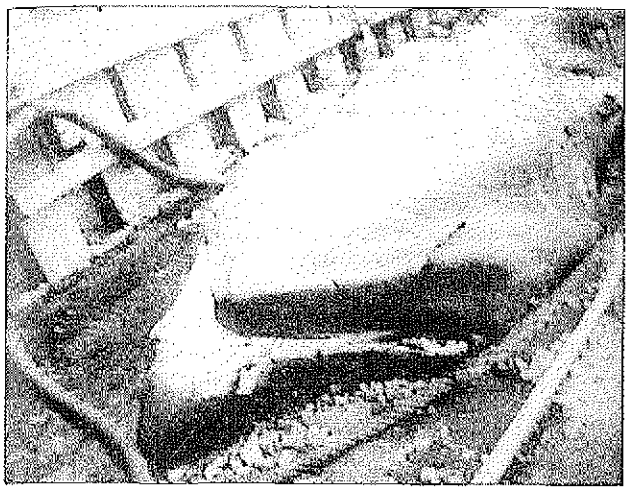

Fig. 2: Basking shark, *Cetorhinus maximus* ***(ca. 700 cm), caught off Pescara (Italy, Western Adriatic Sea) on December 20th 2001. (Photo reproduced by kind permission of M. Di Giovanni)***
Sl. 2: Približno 700 cm dolg morski pes orjak *Cetorhinus maximus,* ***ujet nedaleč od Pescare (Italija, zahodni Jadran) 20. decembra 2001. (Fotografija s prijaznim dovoljenjem M. Di Giovannija)***

Tab. 3: Number of shark specimens captured off Pescara (Italy, Western Adriatic Sea) recorded during the study period (May 2000 - March 2003), by species and percentage of total shark captures.
Tab. 3: Število vrst morskih psov, ujetih v vodah blizu Pescare (Italija, zahodni Jadran) in zabeleženih med preučevanim obdobjem (maj 2000 - marec 2003) po vrstah in odstotkih njihovega skupnega ulova.

SPECIES	No.	%
Hexanchus griseus	8	5.55
Centrophorus sp.	1	0.69
Squalus acanthias	35	24.30
Oxynotus centrina	1	0.69
Alopias vulpinus	1	0.69
Cetorhinus maximus	3	2.08
Lamna nasus	4	2.77
Scyliorhinus canicula	20	13.89
Scyliorhinus stellaris	1	0.69
Scyliorhinus sp.	20	13.89
Leptocharias smithii (?)	2	1.39
Mustelus sp.	41	28.47
Prionace glauca	7	4.86

The lengths of all specimens fell within the ranges previously described for these species. The female *H. griseus* caught on 10 October 2002 and measuring between 450 and 500 cm, is close to the maximum size reported in the literature for this species (at least 482 cm according to Compagno, 1984). We emphasize the fact that five of the recorded smooth-hound specimens exceeded 100-cm length and one measured approximately 150 cm. This further confirms that large smooth-hounds are not uncommon in the Adriatic Sea: the largest *Mustelus mustelus* (165 cm total length) recorded from the entire Mediterranean Sea was captured in the Adriatic (De Maddalena *et al.*, 2001a). Also of interest is the capture of a 600-cm *Alopias vulpinus* that occurred off Giulianova in 1987. Compagno (1984) reported a maximum length for this species of at least 549 cm and possibly as much as 610 cm. Unfortunately in our case, the reported length was only an approximate one and the lack of photographic evidence does not allow us

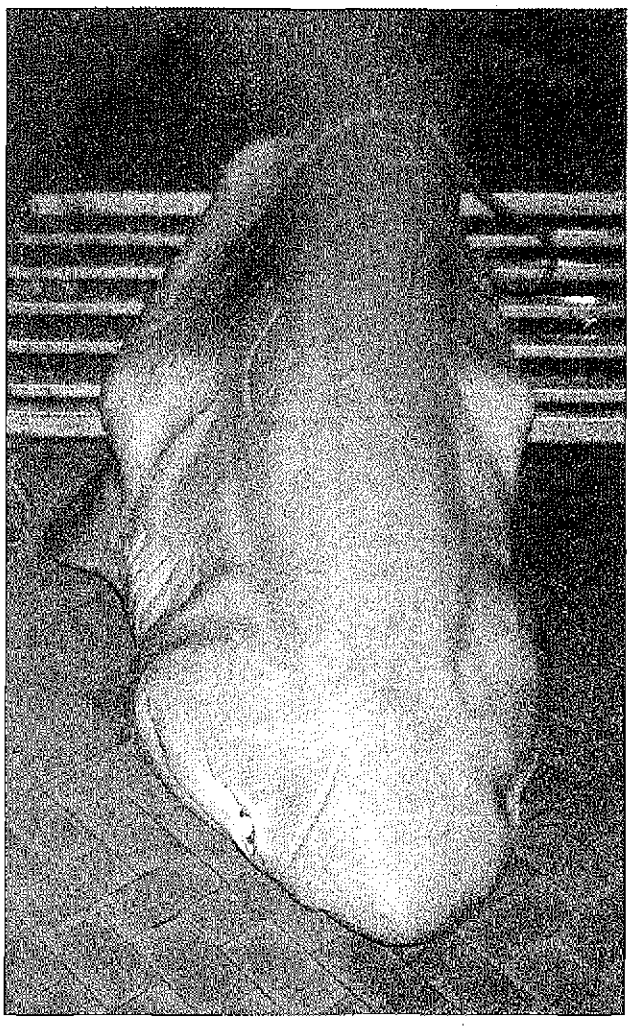

Fig. 3: A female bluntnose sixgill shark, *Hexanchus griseus* ***(350 cm in length), caught off Pescara (Italy, Western Adriatic Sea) on January 22nd 2002. (Photo: G. Cugini)***
Sl. 3: 350 cm dolga samica šesteroškrgarja *Hexanchus griseus,* ***ujeta pri Pescari (Italija, zahodni Jadran) 22. januarja 2002. (Foto: G. Cugini)***

to report a conclusive size. The capture of a 600 cm *Carcharodon carcharias* that occurred sometime in 1945 off Pescara, is also of interest; this species reaches at least 640-660 cm TOT and very probably even more (De Maddalena *et al.*, 2001a). However, as in many other cases of white shark specimens reported to be of very large size, the reported length is approximate, and the lack of photographic evidence precludes reporting a definite length. Two large *Prionace glauca*, one measuring 340 cm and the other approximately 350 cm (they were caught in 1995 and on 11 July 2002 respectively and both documented by photographic evidence), also merit mention (Fig. 4). Finally we note the large approximately 120 cm female *Squalus acanthias* caught on 9 January 2003.

Two of the smooth-hounds, *Mustelus sp.* (one caught in mid-January 2002 and another on 16 January 2003) exhibited a black-spotted coloration that, according to Compagno (1984), is typical of the blackspotted smooth-hound, *Mustelus punctulatus*. However, according to more recent observations, *M. punctulatus* may not be acceptable as a recognized species, since there is not sufficient morphological difference between it and the other smooth-hound species present in the Mediterranean area (J. Barrull & I. Mate, *pers. comm.*; Barrull & Mate, 2002). Moreover, Tortonese (1956) reported that individuals of *M. mustelus* sometimes also exhibit a black-spotted coloration. The collected documentation does not provide conclusive evidence to identify the recorded specimens as either *M. mustelus* or *M. punctulatus*. In order to definitely establish or refute the validity of *M. punctulatus* as a species, one of the authors (A. D.) is currently conducting an extensive collection of morphometric data from *Mustelus* specimens caught in the Mediterranean Sea.

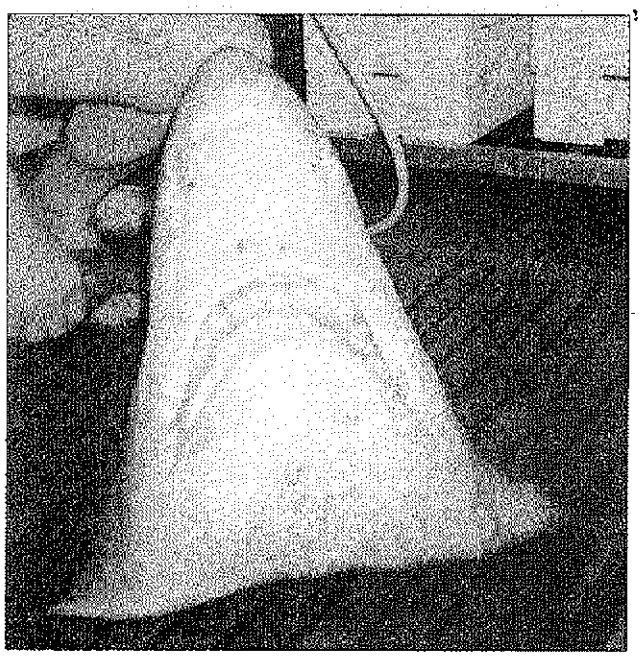

Fig. 4: Head of a ca. 350 cm blue shark, *Prionace glauca,* ***caught off Pescara (Italy, Western Adriatic Sea) on 11 July 2002. (Photo: G. Cugini)***
Sl. 4: Glava kakih 350 cm dolgega sinjega morskega psa *Prionace glauca,* ***ujetega v bližini Pescare (Italija, zahodni Jadran) 11. julija 2002. (Foto: G. Cugini)***

In Italy, shark meat is consumed in all parts of the country; moreover, Italy is the world's leading importer of sharks, according to FAO statistics (Vannuccini, 1999). In Pescara, as has been reported for other Italian regions (Vannuccini, 1999; De Maddalena & Piscitelli, 2001), the meat of most sharks is marketed and sold under incorrect names. Thus, not just *Mustelus* sp., but also *Lamna nasus, Alopias vulpinus, Prionace glauca, Hexanchus griseus* and maybe *Leptocharias smithii* are usually sold as "palombo" (smooth-hound). Exceptions to this practice are *Squalus acanthias* and *Scyliorhinus* sp., which are usually sold under their correct common names of "spinarolo" (piked dogfish) and "gattuccio" (catshark).

CONCLUSIONS

The study of sharks from commercial fisheries and, secondarily, from sportfisheries permits monitoring of the state of local shark populations. The continuous long-term analysis we have conducted provides information on occurrence, relative abundance and fisheries status of some shark species occurring in the study area. The study we present here has been conducted in a relatively simple manner; consequently the results show some incompleteness and approximations. One reason for this is the fact that all of the work for this project has been accomplished through the present time without any support from public or private institutions.

Sharks are being overfished in many parts of the world. As bony fish fisheries have been depleted, fishermen have compensated increasing shark captures. An estimated 50% of the world shark catch is believed to be taken as bycatch, caught accidentally while fishing for other commercial species such as tuna and swordfish. The reproductive biology of sharks (long sexual maturation times, low fecundity, long gestation periods and relatively small litter size) makes them extremely vulnerable to such pressure. Thus, shark stocks are unable to withstand protracted periods of overexploitation.

The apparent decline of shark numbers warrants an urgent investigation into the status of the species involved. Effective conservation and management of shark fisheries is based on research upon the biology, ecology, distribution, abundance and exploitation of sharks. Shark research is often neglected in favour of study of the more commercially important bony fishes despite

the fact that sharks play an important role in marine ecosystems. There is a critical need for biological information on the life history of many shark species in order to better assess stock status and harvest impact. It is also necessary to better manage fisheries in which sharks constitute a significant bycatch (Rose, 1996; Vannuccini, 1999; Watts, 2001). Lack of research and management in many countries, such as is sadly the case in Italy, may lead to the extinction of many shark species. At least 41 species of sharks occur in Italian waters, but there is evidence that many of these have strongly declined during the twentieth century (A. De Maddalena, *unpub. data*). Among these we can cite the sandtiger shark, *Carcharias taurus*, smalltooth sandtiger, *Odontaspis ferox*, white shark, *Carcharodon carcharias*, shortfin mako, *Isurus oxyrinchus*, porbeagle, *Lamna nasus*, tope shark, *Galeorhinus galeus*, sandbar shark, *Carcharhinus plumbeus*, blue shark, *Prionace glauca*, smooth hammerhead, *Sphyrna zygaena*, bramble shark, *Echinorhinus brucus* and angular roughshark, *Oxynotus centrina*.

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POVZETEK

Avtorja predstavljata rezultate študije morskih psov, ujetih v vodah nedaleč od Pescare (Italija, zahodni Jadran) med majem 2000 in marcem 2003. Ujetih je bilo 144 morskih psov najmanj 11 različnih vrst: navadnih morskih psov (Mustelus *sp. in morda* Leptocharias smithii, *29,86% celotnega ulova), morskih mačk* (Scyliorhinus canicula, S. stellaris *in* S. *sp., 28,47%),* Squalus acanthias *(24,30%),* Hexanchus griseus *(5,55%),* Prionace glauca *(4,86%),* Lamna nasus *(2,77%),* Cetorhinus maximus *(2,08%),* Alopias vulpinus *(0,69%),* Oxynotus centrina *(0,69%) in* Centrophorus sp. *(0,69%). Avtorja sta hkrati dobila priložnost zbrati nekaj informacij glede ulova vrst* P. glauca, A. vulpinus, Carcharodon carcharias *in nekaterih neidentificiranih lamnidov, ki so se v teh vodah pojavljali v prejšnjih letih. Vse kaže, da je morski pes šesteroškrgar tu razmeroma številčen, medtem ko je skušolovec pogostejši, kot so sprva domnevali. Po drugi strani pa je maloštevilnost ujetih sinji morskih psov vsekakor razlog za zaskrbljenost.*

Ključne besede: morski psi, ribištvo, Italija, Jadransko morje, Sredozemsko morje

REFERENCES

Barrull, J. & I. Mate (2002): Tiburones del Mediterráneo. Llibreria El Set-ciències, Arenys de Mar, 292 pp.

Compagno, L. J. V. (1984): FAO species catalogue. Vol. 4. Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Parts 1-2. FAO Fisheries Synopsis 125, 1-655.

De Maddalena, A. & L. Piscitelli (2001): Analisi preliminare dei selaci registrati presso il mercato ittico di Milano (aprile-settembre 2000). Bollettino del Museo civico di Storia naturale di Venezia, 52, 129-145.

De Maddalena, A., L. Piscitelli & R. Malandra (2001a): The largest specimen of smooth-hound, *Mustelus mustelus* (Linnaeus, 1758), recorded from the Mediterranean Sea. Bilješke - Notes, 84, 1-7.

De Maddalena, A., Zuffa, M., Lipej, L. & A. Celona (2001b): An analysis of the photographic evidences of the largest great white sharks, *Carcharodon carcharias* (Linnaeus, 1758), captured in the Mediterranean Sea with considerations about the maximum size of the species. Annales, Ser. hist. nat., 11(2), 193-206.

Marconi, M. & A. De Maddalena (2001): On the capture of a young porbeagle, *Lamna nasus* (Bonnaterre, 1788), in the Western Adriatic Sea. Annales, Ser. hist. nat., 11(2), 179-184.

Pallaoro, A. & I. Jardas (1996): Ichthyological collection of the Institute of Oceanography and Fisheries in Split (Croatia). Natura Croatica, 5(3), 177-219.

Rose, D. A. (1996): An overview of world trade in sharks and other cartilaginous fishes. Traffic International, 106 pp.

Soldo, A. & I. Jardas (2002): Large sharks in the Eastern Adriatic. Proc. 4th Elasm. Assoc. Meet., Livorno (Italy) 2000. ICRAM, ARPAT & SFI, p. 141-155.

Tortonese, E. (1956): Fauna d'Italia. Vol. II. Leptocardia, Ciclostomata, Selachii. Calderini, Bologna, 334 pp.

Vannuccini, S. (1999): Shark utilization, marketing and trade. FAO Fish. Tech. Paper 389. FAO, Rome, 472 pp.

Watts, S. (2001): The end of the line? WildAid, San Francisco, 62 pp.