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ON THE OCCURRENCE OF THE PORBEAGLE, *LAMNA NASUS* (BONNATERRE, 1788) (CHONDRICHTHYES: LAMNIDAE), OFF ITALIAN COASTS (NORTHERN AND CENTRAL MEDITERRANEAN SEA): A HISTORICAL SURVEY

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ABSTRACT

*In Italian Seas, a total of 33 Lamna nasus were recorded, ranging in size between 86.7 and about 250 cm; 10 were females, 5 males and 18 of unknown sex. Of the 33 observed specimens, 14 were considered as possibly mature, corresponding to 42.4%. In the Adriatic and Ligurian Seas, four new-born specimens were recorded, ranging in size between 86.7 and 91 cm. It seems that L. nasus does not reproduce in Italian seas, although its reproductive area may exist in some other part of the Mediterranean. L. nasus was most often recorded during the summer, but seems to be present in the study area throughout the year.*

**Key words:** Chondrichthyes, Lamnidae, porbeagle, *Lamna nasus*, Italian seas, Mediterranean Sea

PRESENZA STORICA E CONTEMPORANEA DELLO SMERIGLIO,  
*LAMNA NASUS* (BONNATERRE, 1788) (CHONDRICHTHYES: LAMNIDAE),  
IN ACQUE ITALIANE (MARE MEDITERRANEO)

SINTESI

*Un totale di 33 esemplari di Lamna nasus viene segnalato nei mari d'Italia. Le dimensioni degli esemplari sono comprese tra 86,7 e circa 250 cm; 10 erano femmine, 5 maschi e 18 di sesso ignoto. Abbiamo stimato 14 dei 33 esemplari come verosimilmente maturi, corrispondenti al 42,4%. Quattro neonati sono stati registrati nei Mari Adriatico e Ligure, di dimensioni comprese tra 86,7 e 91 cm. L. nasus sembrerebbe non riprodursi nelle acque italiane, ma un'area riproduttiva potrebbe esistere all'interno del bacino Mediterraneo. L. nasus è stato registrato più frequentemente durante l'estate, ma sembra essere presente nell'area di studio durante tutto l'anno.*

**Parole chiave:** Condritti, Lamnidae, smeriglio, *Lamna nasus*, mari italiani, Mare Mediterraneo

## INTRODUCTION

The porbeagle *Lamna nasus* (Bonnaterre, 1788) is a member of the Lamnidae Müller & Henle, 1838 family. It can be easily identified by its spindle-shaped body, strongly conical snout, lunate caudal fin, strong primary caudal keels and small secondary keels, moderately large bladelike teeth with a pair of lateral cusplets, a conspicuous white rear tip of first dorsal fin (Castro, 1983; Compagno, 1984). Its speed and power can be explained by a complex blood vessel heat-exchanging arrangement: in fact, we could consider this condition as warm-bloodedness or endothermy, well known also in other mackerel sharks (Carey *et al.*, 1985). It feeds on bony fishes, sharks, squids and crustaceans (Joyce *et al.*, 2002). Its longevity estimate is 46 years (Natanson *et al.*, 2002).

The porbeagle is an important object of commercial fisheries all around the world for its high-quality meat, mainly caught on pelagic longlines, and also highly considered for sport-fishery. Intensive fishery greatly reduced the population of porbeagles in the North Atlantic Ocean and the Mediterranean Sea (Castro, 1983; Compagno, 1984; Moreno, 1995; Vannuccini, 1999; Watts, 2001).

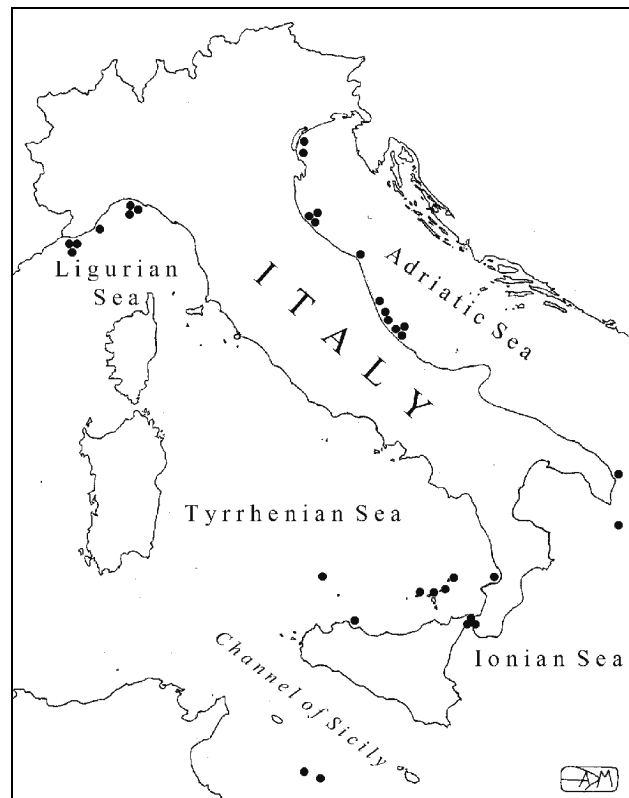
The porbeagle is a pelagic, epipelagic, or littoral shark that is usually more common on continental shelves, but is also found far from land in ocean basins (Scott & Scott, 1988; Compagno 2001). It ranges in depth from the surface to at least 700 m (Compagno, 2001). It prefers waters colder than 18° C (Aasen, 1963). It is widely distributed in the cold temperate waters of the North Atlantic, South Atlantic, South Indian and South Pacific Oceans. In the Mediterranean, it is indicated as rare or very rare in all waters (Tortonese, 1938; Capapé, 1989; Buencuerpo *et al.*, 1998; Barrull *et al.*, 1999; Kabasakal, 2003; Kabasakal & Kabasakal, 2004; Lipej *et al.*, 2004). Therefore, we consider it particularly interesting to provide a survey on the occurrence of porbeagles off Italian coasts based on both historical and recent data.

## MATERIAL AND METHODS

The search for data on porbeagles from the Italian seas was effectuated by examination of the captured sharks, location and study of specimens preserved in natural history museums, collaboration with commercial fishermen, sport fishermen, scuba divers and bibliographical research. This program is an initiative lead by the Italian Ichthyological Society (Società Ittiologica Italiana).

For every case, whenever possible, the following data were collected: date and location of the record, total length (TOT) or fork length (FOR) in cm (following Compagno, 1984), weight in kg, sex of the specimen,

type of record (capture or sighting), distance from the coast, information about specimens preserved in museums and catalogue number (cat. no.) in the collections, as well as any additional details. Detailed morphometric measurements were made by A. De Maddalena of a 163 cm male porbeagle caught off Cesenatico (Italy), Adriatic Sea, on 4 July 2001, following the procedure of Compagno (1984). The fork length – total length relationship presented by Kohler *et al.* (1996),  $FL = (0.8971) TL + 1.7939$ , was used to calculate the total length of a porbeagle caught off Stromboli.



**Fig. 1: Area of the Mediterranean Sea showing the locations of porbeagle captures and sightings presented in this work. (Drawing: A. De Maddalena)**

**Sl. 1: Območje Sredozemskega morja z lokalitetami, v katerih so bili ujeti in opaženi atlantski skušolovci, predstavljeni v tem članku. (Risba: A. De Maddalena)**

## RESULTS

To date, 33 *L. nasus* have been recorded off Italian coasts (Fig. 1). Of these, 7 are referred to the Ligurian Sea, 10 to the Southern Tyrrhenian Sea and the Messina Strait, 2 to the Sicilian Channel, 1 to the Ionian Sea and 13 to the Western Adriatic Sea.

In addition to the records described above, for the sake of completeness, it is of some interest to report that in other museums there are three additional specimens

**Tab 1: Records of the porbeagle *Lamna nasus* (Bonnaterre, 1788) from Italian seas.****Tab. 1: Podatki o atlantskem skušolovcu *Lamna nasus* (Bonnaterre, 1788) iz italijanskih morij.**

Date	Location	Sex	TOT (cm)	Weight (kg)	Notes	Source
1871	Palermo	-	-	-	Capture	Doderlein (1881)
Nov 1880	Alassio	-	-	-	Capture	Tortonese & Trotti (1949)
6 May 1913	Genova Boccadasse	F	200	-	Capture. Preserved taxidermied in the Museum of Natural History "G. Doria" of Genoa (cat. no. MSNG 1662).	Ariola (1913), Tortonese (1956), G. Doria ( <i>pers. comm.</i> )
1958	Camogli	-	236	120	Caught in tuna-trap	Boero & Carli (1979)
7 Jul 1959	Pizzo Calabro	-	138	25	Capture	Genovese (1960)
summer 1987	Torre Faro	-	ca. 180	-	Caught with harpoon	A. Arena ( <i>pers. comm.</i> )
Aug 1992	Otranto	-	ca. 250	-	Capture. Possibly the same specimen was encountered by scuba diver Andrea Del Coco a week earlier between Otranto and Porto Badisco.	A. Del Coco ( <i>pers. comm.</i> )
1994	Albarella	-	-	240	Caught by sport-fishermen	R. Basanisi ( <i>pers. comm.</i> )
summer 1995	Ganzirri	-	ca. 200	-	Caught with harpoon, 300 m offshore	M. Mancuso ( <i>pers. comm.</i> )
31 Jul 1995	Pieve Ligure	-	-	-	Caught 6 NM offshore. Preserved in liquid in the Museum of Natural History "G. Doria" of Genoa (cat. no. MSNG 48692).	G. Doria ( <i>pers. comm.</i> )
summer 1998	Lampedusa	-	ca. 200	-	Caught with surrounding net	P. Billeci ( <i>pers. comm.</i> )
18 Aug 1998	Sanremo	F	87.1	-	Capture. Preserved in liquid in the Museum of Natural History "G. Doria" of Genoa (cat. no. MSNG 50789).	Orsi Relini & Garibaldi (2002), G. Doria ( <i>pers. comm.</i> )
18 May 1999	Salina, Eolie Islands	F	175 (FOR)	-	Caught with tuna longline	Examined by A. C.
10 Sep 1999	Sanremo	F	86.7	-	Capture. Preserved in liquid in the Museum of Natural History "G. Doria" of Genoa (cat. no. MSNG 50785).	Orsi Relini & Garibaldi, (2002), G. Doria ( <i>pers. comm.</i> )
Feb 2000	Eastern Ionian Sea	-	ca. 200	-	Caught with tuna longline	V. Testa ( <i>pers. comm.</i> )
9 Feb 2000	Giulianova	-	163	-	Caught with tuna longline	A. Celona ( <i>pers. comm.</i> )
summer 2000	Ancona	M	152	-	Caught with longline. Preserved in liquid in the Marine Biology Laboratory of Fano.	G. Mattioli ( <i>pers. comm.</i> )
summer 2000	Pescara	-	ca. 200	-	Caught by sport-fishermen	Cugini & De Maddalena (2003)
21 Jul 2000	Capo San Raineri	F	185 (FOR)	-	Caught with harpoon	Examined by A. C.
31 Jul 2000	Sanremo	F	89.3	-	Capture. Preserved in liquid in the Museum of Natural History "G. Doria" of Genoa (cat. no. MSNG 50784).	Orsi Relini & Garibaldi (2002), G. Doria ( <i>pers. comm.</i> )
May 2001	Southern Tyrrhenian Sea	-	ca. 180	-	Caught with tuna floating gillnet	A. Sanfilippo ( <i>pers. comm.</i> )
8 May 2001	Pescara	M	ca. 150	35	Capture	Cugini & De Maddalena (2003)
12 Jun 2001	Panarea, Eolie Islands	-	ca. 200	-	Caught with surrounding net, 25 NM off Panarea	G. Galano ( <i>pers. comm.</i> )
4 Jul 2001	Cesenatico	M	163	-	Brought to the fish market in Milan	Examined by A. D.
4 Jul 2001	Cesenatico	F	ca. 160	-	Brought to the fish market in Milan	L. Piscitelli ( <i>pers. comm.</i> )
4 Jul 2001	Cesenatico	F	ca. 160	-	Brought to the fish market in Milan	L. Piscitelli ( <i>pers. comm.</i> )
15 Jul 2001	S. Benedetto del Tronto	F	91	6.5	Caught by sport-fisherman. Stomach contained sardines, <i>Sardina pilchardus</i> . Preserved in the Museo Ittico Augusto Capriotti in San Benedetto del Tronto (cat. no. 1850).	Marconi & De Maddalena (2001)
Dec 2001	Pescara	F	ca. 250	-	Capture. Filmed.	Cugini & De Maddalena (2003)
Feb-Mar 2002	Giulianova	-	180	-	Caught by professional fisherman	Cugini & De Maddalena (2003)
10 Jun 2002	Filicudi, Eolie Islands	M	187 (FOR)	-	Caught with floating gillnet	Examined by A. C.
15 Apr 2003	Stromboli, Eolie Islands	M	206 (FOR)	-	Caught with tuna longline	Examined by A. C.
Feb 2004	Venezia	-	ca. 150	-	Capture	G. Cugini ( <i>pers. comm.</i> )
26 Sep 2004	Lampione	-	ca. 200	-	Sighting	Sighted by A. C.



**Fig. 2:** A 163 cm male porbeagle *Lamna nasus* (Bonnaterre, 1788) caught off Cesenatico (Italy), Adriatic Sea, on 4 July 2001. (Photo: A. De Maddalena)

**Sl. 2:** 163 cm dolgi samec atlantskega skušolovca *Lamna nasus* (Bonnaterre, 1788), ujet 4. julija 2001 nedaleč od Cesenatica v Jadranskem morju. (Foto: A. De Maddalena)

whose capture location is unknown, but for which it can be hypothesized that they may be from Italian waters. In the Museum of Natural History and the Territory of Calci there is a young taxidermied preserved specimen, possibly referable to the 19th century, in the Museum of Natural History "Fontego dei Turchi" of Venice there is a 112 cm taxidermied female (cat. no. 7841) (Mizzan, 1994), and in the Museum of Natural History of Trieste there is a set of jaws belonging to a specimen caught in the Adriatic Sea.

For each specimen, the following data are reported in Table 1: capture date, capture location, sex (M or F), total length (TOT or, where indicated, FOR) in cm, weight in kg, notes and data source. Morphometric measurements of a 163 cm male porbeagle caught off Cesenatico on 4 July 2001 (Fig. 2) are presented in Table 2.

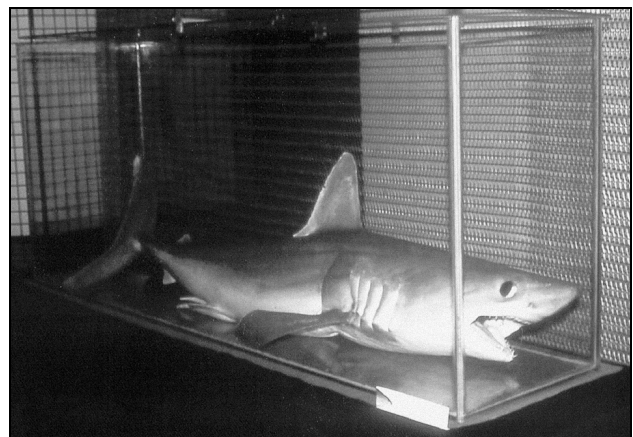
## DISCUSSION

The paucity of data collected from Italian seas confirms the rarity of *L. nasus* in the Mediterranean area. *L. nasus* was recorded most often during the summer (e.g. Fig. 3), but seems to be present in the study area throughout the year.

The porbeagle is a large species that can reach 360 cm in total length (Castro, 1983; Compagno, 1984). The lengths of the specimens fell within the ranges previously described for this species. The recorded lengths of the specimens ranged from 86.7 to about 250 cm (e.g. Fig. 4). In December 2001, a large female was landed in the Pescara harbour, where it had been transported following its capture in adjacent waters. The total length of the specimen was not accurately measured, but it was subsequently estimated at about 250 cm (Cugini & De

Maddalena, 2003). In late August 1992, an approx. 250 cm porbeagle was caught off Otranto; possibly the same specimen was encountered a week earlier by scuba diver Andrea Del Coco at 28 m depth, between Otranto and Porto Badisco (A. Del Coco, *pers. comm.*). Other large porbeagles recorded are a 236 cm specimen caught off Camogli in 1958 (Boero & Carli, 1979) and a 206 cm FOR male caught off Stromboli on 15 April 2003. From the fork length - total length relationship presented by Kohler *et al.* (1996), we calculated the total length of the Stromboli specimen to be 227.63 cm.

Of the 33 specimens, 10 were females, 5 males and 18 of unknown sex. Porbeagle's mode of reproduction is aplacental viviparity and embryos are nourished by oophagy; *L. nasus* may take 5 or more years to reach maturity: in the Northern Hemisphere, males mature at about 150-200 cm total length, females at about 200-229 cm (Francis & Stevens, 2000; Barrull & Mate, 2002). In our study, gonads were not examined, and we estimated the reproductive state on the basis of the specimens' size. In total we estimated 14 of the 33 specimens as possibly mature, corresponding to 42.4%. The gestation period is 8-9 months (Francis & Stevens, 2000), and in the North Atlantic birth occurs in spring and summer (Castro, 1983; Francis & Stevens, 2000); litter sizes are 2-6, and size at birth is 68-89 cm total length (Francis & Stevens, 2000; Mollet, 2001; Jensen *et al.*, 2002). In our study, four new-born specimens, ranging from 86.7 to 91 cm, were recorded - one from the Adriatic Sea and three from the Ligurian Sea (Marconi & De Maddalena, 2001; Orsi Relini & Garibaldi, 2002; G. Doria, *pers. comm.*). No pregnant females were recorded. We



**Fig. 3:** A 152 cm male porbeagle *L. nasus* caught off Ancona (Italy), Adriatic Sea, in the summer of 2000, and preserved in the Marine Biology Laboratory of Fano. (Photo: M. Zuffa)

**Sl. 3:** 152 cm dolgi samec atlantskega skušolovca *L. nasus*, ujet poleti 2000 nedaleč od Ancone v Jadranskem morju in shranjen v Morskem biološkem laboratoriju v Fanu. (Foto: M. Zuffa)

**Tab. 2: Measurements of a 163 cm male porbeagle *Lamna nasus* (Bonnaterre, 1788) caught off Cesenatico (Italy), Adriatic Sea, on 4 July 2001 (following terminology and parameters of Compagno, 1984). All measurements are given in centimetres.**

**Tab. 2: Dimenzije 163 cm dolgega samca atlantskega skušolovca *Lamna nasus* (Bonnaterre, 1788), ujetega 4. julija 2001 v bližini Cesenatica (Italija), Jadransko morje (po terminologiji in parametrih Compagna, 1984). Vse dimenzije so v cm.**

Abbreviation	Measurement	cm	% TOT
TOT	total length (caudal fin in depressed position)	163	100.0
FOR	fork length	139	85.3
PRC	precaudal length	124.5	76.4
PD2	pre-second dorsal length	110	67.5
PD1	pre-first dorsal length	53	32.5
PG1	prebranchial length	33.5	20.6
POB	preorbital length	11.4	7.0
PP1	prepectoral length	41.5	25.5
PP2	prepelvic length	85	52.2
PAL	preanal length	111.5	68.4
PRN	prenarial length	8	4.9
POR	preoral length	10	6.1
EYL	eye length	3.1	1.8
EYH	eye height	2.6	1.6
GS1	first gill slit height	12	7.4
P1A	pectoral anterior margin	28.8	17.7
P1B	pectoral base	12	7.4
P1P	pectoral posterior margin	25	15.3
CDM	dorsal caudal margin	38	23.3
CPV	preventral caudal margin	25	15.3
CPL	lower post ventral caudal margin	18.5	11.4
D1A	first dorsal anterior margin	21	12.9
D1B	first dorsal base	14	8.6
D1H	first dorsal height	18.5	11.4
D1I	first dorsal inner margin	6.5	4.0
D2A	second dorsal anterior margin	5	3.1
D2B	second dorsal base	2.5	1.5
D2H	second dorsal height	3	1.8
D2I	second dorsal inner margin	5	3.1
D2P	second dorsal posterior margin	5	3.1
ANA	anal anterior margin	5	3.1
ANB	anal base	3	1.8
ANH	anal height	3.5	2.2
ANI	anal inner margin	5	3.1
ANP	anal posterior margin	4.5	2.8
MOL	mouth length	7.5	4.6
MOW	mouth width	11.5	7.1
NOW	nostril width	1.5	0.9

therefore presume that *L. nasus* does not reproduce in Italian seas, but given the presence of new-born specimens we cannot exclude that a reproductive area may exist in some other part of the Mediterranean Sea.

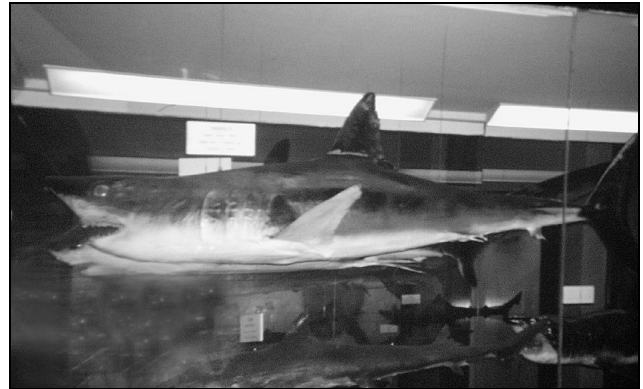
Porbeagles appear to be inoffensive animals. These sharks very rarely approach divers closely. We are un-

aware of any aggressive, provoked or unprovoked incidents involving humans in these waters.

Apparently, porbeagles are rarely caught by professional fishermen operating in the study area. The fishing gear used is pelagic longlines, floating gillnets, surrounding nets, tuna-traps and harpoon. Most porbeagles

were taken as bycatch, primarily with the same pelagic longlines used to fish tuna and swordfish. These sharks were retained and sold for human consumption. Due to its large size and high quality flesh, porbeagle is considered an important source of shark meat in Italy. In domestic markets, porbeagle meat is marketed fresh or frozen for human consumption. It can often be found in the markets, but mainly imported from North-eastern Atlantic Countries and Japan (De Maddalena & Piscitelli, 2001). In Italy, the meat of many sharks is marketed under incorrect names and *L. nasus* is usually sold as "palombo" (smooth-hound *Mustelus* sp.).

There are no regulations or control over the porbeagle fishery in Italy. The absence of any other details on the porbeagle fishery in the area does not allow an assessment of the status of their stocks in these waters, however, according to local fishermen and traders, these sharks have greatly declined. Effective management of fisheries is needed in order to avoid a rapid decline in the near future. These management decisions are based on research on the biology, ecology, distribution, abundance and exploitation of the species. As the sharks constitute a significant by-catch of commercial fishing vessels, it is also necessary to improve management of fisheries for the effective conservation of shark populations (Vannuccini, 1999; Watts, 2001).



**Fig. 4: A 200 cm female porbeagle *L. nasus* caught off Genova Boccadasse (Italy), Ligurian Sea, on 6 May 1913, and preserved in the Museum of Natural History "G. Doria" of Genoa with cat. no. MSNG 1662. (Photo: A. De Maddalena)**

**Sl. 4: 200 cm dolga samica atlantskega skušolovca *L. nasus*, ujeta 6. maja 1913 v Ligurskem morju (Italija) blizu Genove Boccadasse in shranjena v Prirodoslovnem muzeju "G. Doria" v Genovi pod kataložno številko MSNG 1662. (Foto. A. De Maddalena)**

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O POJAVLJANJU ATLANTSKEGA SKUŠOLOVCA *LAMNA NASUS* (BONNATERRE, 1788)  
(CHONDRICHTHYES: LAMNIDAE) V ITALIJANSKIH OBALNIH VODAH  
(SEVERNO IN SREDNJE SREDOZEMSKO MORJE): ZGODOVINSKI PREGLED

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POVZETEK

V italijanskih morjih je bilo doslej zabeleženih 33 atlantskih skušolovcev *Lamna nasus*, dolgih med 86,7 in približno 250 cm; 10 je bilo samic, 5 samcev, 18 neznanega spola. Od 33 preučevanih osebkov jih je bilo 14 (42,4 %) najverjetneje spolno zrelih. V Jadranskem in Ligurskem morju so bili zabeleženi 4 novorojeni osebki, dolgi med 86,7 in 91 cm. Čeprav vse kaže, da se *L. nasus* ne razmnožuje v italijanskih morjih, pa utegne biti njegov razmnoževalni okoliš v kakem drugem delu Sredozemskega morja. *L. nasus* je bil najpogosteje ujet ali opažen v poletnih mesecih, vendar se v preučevanem območju najverjetneje pojavlja čez vse leto.

**Ključne besede:** Chondrichthyes, Lamnidae, atlantski skušolovec, *Lamna nasus*, italijanska morja, Sredozemsko morje

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