

## DISTRIBUTION AND BIOLOGY OF THE BLUNTNOSE SIXGILL SHARK, *HEXANCHUS GRISEUS* (BONNATERRE, 1788) (CHONDRICHTHYES: HEXANCHIDAE), FROM TURKISH WATERS

Hakan KABASAKAL

Ichthyological Research Society, Atatürk mahallesi, Menteşoğlu caddesi, İdil apt., No: 30/4, Ümraniye, TR-34764 İstanbul, Turkey  
E-mail: hakankabasakal@hotmail.com

### ABSTRACT

*Hexanchus griseus* (Bonnaterre, 1788) is a rare by-catch species in Turkish waters. Author presents total length/weight relationship of *H. griseus* captured in Turkish waters. Sixgill sharks are captured mostly between September and March, and peaked in February as well as in July, although only exceptionally ( $n = 10$ , in both months), when fishing is prohibited in Turkish seas. The main source of sixgill sharks, captured in the fishing-prohibited season, are the illegally operated bottom-trawlers and purse-seiners, which land the incidentally captured specimens only for display and media interest. This fact indicates a persisting fishing pressure on *H. griseus* throughout the year. Sixgill sharks were primarily captured by purse-seiners. Bony fishes were the main prey items and found in the 9 of 12 stomachs (75%). The sex ratio is 1 : 2.5 in favour of females. This numerical dominance of females may indicate some form of sex segregation, although several adults would be required before any such conclusion could be drawn.

**Key words:** *Hexanchus griseus*, sixgill shark, distribution, biology, Turkish seas, by-catch

## DISTRIBUZIONE E BIOLOGIA DI SQUALO CAPOPIATTO, *HEXANCHUS GRISEUS* (BONNATERRE, 1788) (CHONDRICHTHYES: HEXANCHIDAE), IN ACQUE TURCHE

### SINTESI

*Hexanchus griseus* (Bonnaterre, 1788) è una specie che di rado viene catturata involontariamente in acque turche. L'autore presenta il rapporto fra lunghezza totale e peso negli esemplari di squalo capopiatto catturati nel mare della Turchia. Questi squali sono stati catturati in prevalenza tra settembre e marzo, con un picco nel mese di febbraio e talvolta a luglio, quando la pesca è addirittura proibita. La cattura di questa specie nel periodo in cui la pesca non è consentita, avviene in prevalenza con le reti a strascico. Gli esemplari vengono poi esposti sulla terraferma come attrazione e per il grande interesse dei media. Questi dati dimostrano che *H. griseus* è sottoposto a una forte pressione di pesca durante tutto l'anno. In 9 di 12 stomaci di questa specie esaminati sono stati ritrovati pesci ossei, che sembrano essere le prede più ambite. Il rapporto fra i sessi è risultato di 1 : 2,5 a favore delle femmine. La dominanza delle femmine fa supporre una forma di segregazione sessuale. Tale ipotesi potrebbe venir confermata con un numero maggiore di esemplari adulti esaminati.

**Parole chiave:** *Hexanchus griseus*, squalo capopiatto, distribuzione, biologia, acque turche, cattura involontaria

## INTRODUCTION

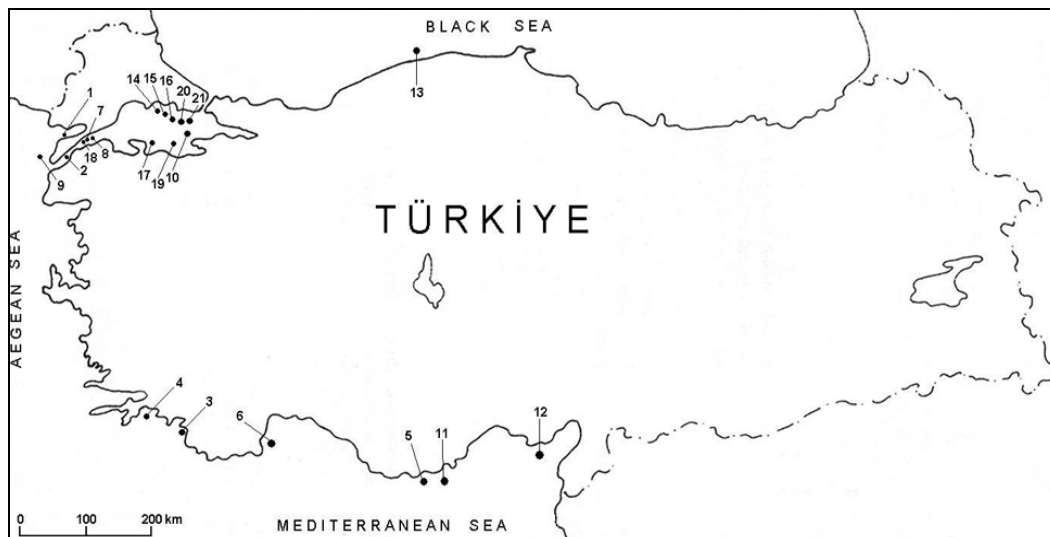
The bluntnose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788), is a large, wide-ranging, benthic or pelagic deep-sea shark of subarctic, temperate and tropical seas, living over insular and continental shelves and upper slopes (Compagno, 1984), from the surface to 2500 m (Zhan *et al.*, 1987; in Ebert, 1994). Its presence in the Mediterranean Sea as well as in the adjacent waters has been well documented in specific studies on the species (e. g. Barrull & Mate, 2000; Capapé *et al.*, 2003, 2004; Kabasakal, 1998, 2004, 2005), as well as in general ichthyological (Carus, 1889-1893; Riedl, 1983; Boeseman, 1984; Bilecenoğlu *et al.*, 2002) and several regional works such as by Capapé (1977) off Toulon, Quignard & Capapé (1972) in Tunisia, Barrull *et al.* (1999) in Catalan waters, Lipej *et al.* (2004) in the Adriatic Sea, Tortonesi (1956) and Bini (1967) in Italy, Cugini & De Maddalena (2003) off Pescara (Italy), Ben-Tuvia (1971) and Golani (1997) in Israel, and Kabasakal & Kabasakal (2004) in the northern Aegean Sea.

Although no targeted fishery is carried out on *H. griseus* in Turkish waters, it is accidentally captured by fishermen. Like many other sharks occurring in Turkish waters, study of *H. griseus* has been neglected in favour of more commercially important bony fishes for many years. Due to the drastic decline in stocks of many commercial bony fishes during the last two decades, there has been a tendency for considering the sharks as targeted species in marine fishery (Kabasakal & Kabasakal, 2004). However, the obvious paucity of necessary

information on the life history parameters and population dynamics of many species, complicates the implementation of regulatory measures on shark fishery. This circumstance, in turn, complicates the conservation of sharks, including *H. griseus* in Turkish waters.

In order to create a database on sharks of Turkish waters, the Ichthyological Research Society (IRS) has been carrying out regular surveys on sharks, including *H. griseus*, since 2000. In a recent study on *H. griseus* carried out by IRS, Kabasakal (2004) reported data on reproductive biology and stomach contents of 39 specimens captured by commercial fishing vessels. Based on the captures of two specimens, one in prebosphoric waters (Kabasakal, 2004; case No. 32) and one off the coast of Bartın (central part of Turkish Black Sea coast; Kabasakal, 2005), the author suggested that the distribution of *H. griseus* may have extended to the Black Sea.

After the pioneering study by Kabasakal (2004), the ongoing research on the bio-ecology of *H. griseus* revealed the capture of further 21 specimens, mostly landed by the commercial fishing fleet along the Anatolian coast. In the present study, case stories of these 21 specimens are presented. Furthermore, length-weight relationship of *H. griseus* from Turkish waters is given for the first time, based on the recorded data of a subgroup of specimens ( $n = 34$ ), based on the data of Kabasakal (2004) and the recent 21 specimens. The seasonality of *H. griseus* captures from Turkish waters is given based on the data of 53 specimens. The present status of sixgill shark fishery in Turkish waters is also discussed.



**Fig. 1:** Map indicating the fishing localities of 21 specimens of *H. griseus*, captured between 1998 and 2005 by means of various fishing vessels along Turkish coast. Numbers on the map are same as case Nos. in Table 1.

**Sl. 1:** Pomorska karta z lokacijami vzdolž turške obale, na katerih je bilo med letoma 1998 in 2005 z različnimi ribiškimi plovili ujetih 21 morskih psov šesteroškrjarjev *H. griseus*. Številke na pomorski karti so iste kot v prvem stolpcu Tabele 1.

## MATERIAL AND METHODS

The present study is part of an extensive investigation on the distribution and bio-ecological aspects of *Hexanchus griseus* from Turkish waters, which has been carried out since 2000. Information on the bluntnose sixgill sharks has been obtained from the following sources: (a) examination of the specimens landed at fishing ports, (b) examination of the preserved specimens, jaws or teeth, which are kept in public museums or private collections, and (c) review of the articles on the bluntnose sixgill shark, published in scientific journals, newspapers or fishing magazines. Whenever possible, the following data have been recorded for every captured specimen: total length (TOT; Compagno, 1984), weight (W), sex, locality of capture, depth of capture and date of capture.

Length-weight relationship of 34 specimens, whose length and weight were recorded, was computed. Due to small sample size, length-weight relationship is expressed for sexes combined. Linear regression is based on the log length and log weight data.

## RESULTS AND DISCUSSION

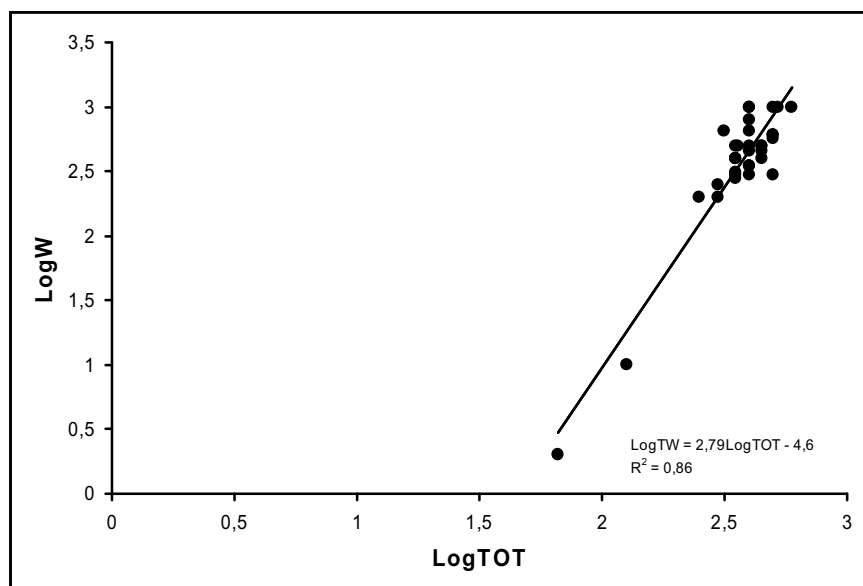
Fishing data of 21 *H. griseus* specimens, captured between 1998 and 2005, are summarised in Table 1. Capture locations of these specimens are shown in Figure 1.

## Length-weight relationship

Total length (TOT) versus total weight (TW) relationship of *H. griseus* captured in Turkish waters is  $\log TW = 2.79 \times \log TOT - 4.6$  and  $r = 0.92$  ( $n = 34$ , sexes combined, Fig. 2).

Maximum total length of the largest specimen captured during the present study was 600 cm, while the weight was 1000 kg (Tab. 1, case No. 7). However, as the weight of the largest specimens (500 cm TOT) captured off Naples and Sardinia did not exceed 600 kg (Capapé *et al.*, 2000), the weight of the specimen No. 7 appears to be overestimated.

In a recent study by Capapé *et al.* (2003), length-weight relationship of *H. griseus* based on 29 specimens out of a total of 114 sixgill sharks, captured in different regions of Mediterranean Sea, has been computed as  $\log TW = 3.137 \times \log TOT - 8.6133$ ,  $r = 0.957$ . The similarity between length-weight relationships of the present study and Capapé *et al.* (2003) is statistically significant ( $p < 0.05$ , student's t-test). However, with the exception of two specimens (case Nos. 14 and 26, 126 and 66 cm TOT, respectively, in Kabasakal, 2004) total lengths of the remaining 58 sixgill sharks were over 250 cm. Hence, length-weight relationship of *H. griseus* given in the present study may be assumed as representing specimens over 250 cm TOT. Therefore, morphometric data of more juveniles is required in order to calculate the length-weight relationship of the entire population.



**Fig. 2: Total length (TOT) vs. weight (W) relationship of *H. griseus*, captured in Turkish waters ( $n = 34$ , sexes combined).**

**Sl. 2: Razmerje med celotno dolžino (TOT) in težo (W) morskih psov šesteroškrjarjev, ujetih v turških vodah ( $n = 34$ , oba spola).**

**Tab. 1: Fishing data and observations of 21 specimens of *H. griseus*, captured between 1998 and 2005 by means of various fishing vessels along Turkish coast. Case numbers of the specimens indicate the locality of capture in Figure 1. TOT: Total length; W: Weight.**

**Tab. 1: Podatki o 21 morskih psih šesteroškrjarjih *H. griseus*, ujetih med letoma 1998 in 2005 z različnimi ribiškimi plovili vzdolž turške obale. Številke v prvem stolpcu ponazarjajo lokalitete ulova, kot so prikazane na Sliki 1. TOT: celotna dolžina; W: teža.**

No.	Date	Locality	Fishing gear	Observations
1	20 Jul 1998	Northern Aegean Sea	Bottom-trawl	400 cm TOT, W ca. 1000 kg, sex unknown (A. Malkoçoğlu, pers. comm.)
2	5 Jun 1999	Dardanelle Strait	?	450 cm TOT, W (?), female, stranded specimen; (C. Boşnak, pers. comm.)
3	16 Feb 2001	SE Aegean Sea	Purse-seine	523 cm TOT, W 1000 kg, female, remains of swordfish ( <i>Xiphias gladius</i> , ca. 6 kg) and dolphin blubber (ca. 3 kg) found in the stomach content
4	16 Mar 2001	SE Aegean Sea	Swordfish long-line	500 cm TOT, W 570 kg, female, remains of tuna (ca. 10 kg) found in the stomach content
5	16 Apr 2004	Mediterranean Sea	Trammel-net	250 cm TOT, W (?), male, remains of spurdog ( <i>Squalus</i> spp., 2 dorsal fin) and squid ( <i>Loligo</i> spp.) found in the stomach content
6	12 May 2004	Mediterranean Sea	?	250 cm TOT, W 200 kg, male, captured in coastal waters at a depth of ca. 75 m
7	23 Jul 2004	Marmaric entrance of Dardanelle Strait	Bottom-trawl	600 cm TOT, W ca. 1000 kg, female, remains of dolphin (ca. 3 kg) and shark ( <i>Mustelus</i> spp., ca. 2 kg) found in the stomach content
8	23 Jul 2004	Marmaric entrance of Dardanelle Strait	Gill-net	500 cm TOT, W ca. 1000 kg, sex unknown, remains of dolphin (ca. 3 kg) and teleosts (Scombridae, ca. 4 kg) found in the stomach content
9	23 Sep 2004	Northern Aegean Sea	Trammel-net	450 cm TOT, W 500 kg, male, remains of hake ( <i>Merluccius merluccius</i> , ca. 4 kg) found in the stomach content
10	27 Sep 2004	Sea of Marmara	Purse-seine	360 cm TOT, W 500 kg, female, remains of bonyfishes, chondrichthyans, cephalopods and dolphin found in the stomach content
11	27 Oct 2004	Mediterranean Sea	Bottom-trawl	500 cm TOT, W 600 kg, female
12	6 Nov 2004	Mediterranean Sea	Bottom-trawl	350 cm TOT, W 400 kg, female
13	19 Nov 2004	Western Black Sea	Gill-net	300 cm TOT, W 250 kg, sex unknown
14	25 Nov 2004	Sea of Marmara	Purse-seine	350 cm TOT, W 400 kg, female, remains of hake (ca. 2 kg) found in the stomach content
15	25 Nov 2004	Sea of Marmara	?	450 cm TOT, W 400 kg, sex unknown, remains of spurdog and hake found in the stomach content, caudal fin of the specimen preserved and displayed at fish market (Fig. 5)
16	29 Nov 2004	Sea of Marmara	Purse-seine	350 cm TOT, W 300 kg, female, remains of squid (ca. 3 kg) and bonyfishes found in the stomach content
17	29 Nov 2004	Sea of Marmara	Purse-seine	400 cm TOT, W 450 kg, female
18	7 Dec 2004	Marmaric entrance of Dardanelles strait	Bottom-trawl	400 cm TOT, W 300 kg, sex unknown
19	26 Dec 2004	Sea of Marmara	Gill-net	350 cm TOT, W 400 kg, sex unknown, remains of hake and clupeid bonyfishes (Clupeidae) found in the stomach content
20	12 Feb 2005	Sea of Marmara	Purse-seine	300 cm TOT, weight and sex unknown, remains of hake and horse mackerel ( <i>Trachurus</i> spp.) found in the stomach content
21	20 Feb 2005	Sea of Marmara	Purse-seine	450 cm TOT, weight and sex unknown, jaws of the specimen preserved and displayed at fish market (Fig. 6)

### Seasonality of captures

The combined results of the present study and Kabasakal (2004) show that sixgill sharks are captured mostly between September and March, and peaked in February as well as, although only exceptionally, in July ( $n = 10$ , in both months), when fishing is prohibited in Turkish seas (Fig. 3).

Sixgill sharks were captured primarily by means of purse-seiners and followed by trammel netters, trawlers, gill netters, and the fishing boats using shark nets and swordfish long-lines (Fig. 4).

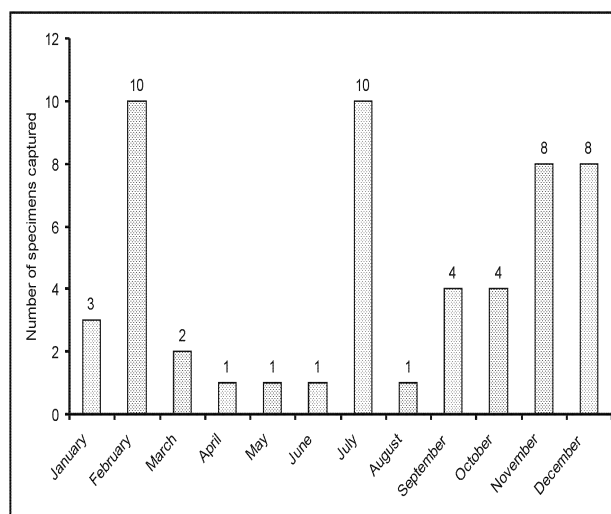
In Turkish waters, fishing season lasts between September and May. Capture of 13 sixgill sharks between May and August, when fishing is prohibited, indicates a persisting fishing pressure on *H. griseus* throughout the year. The dates of capture of 114 sixgill sharks recorded by Capapé *et al.* (2003) show that capture of *H. griseus* in the Mediterranean spreads throughout the year, the same as in Turkish seas.

### Stomach contents

Food remains were found in the stomachs of 12 sixgill sharks (57%, Tab. 1). Bony fishes, which were the main prey items, were found in 9 of the 12 stomachs (75%), followed by chondrichthyans and marine mammals (both were found in 3 stomachs (25%)), as well as cephalopods (in 2 stomachs, 17%). Hake (*Merluccius merluccius*) was the main prey (in 5 stomachs, 42%).

According to Ebert (1986), the diet of *H. griseus* primarily consists of bony fishes and chondrichthyans. Barrull & Mate (2000) found *Scyliorhinus canicula*, *Galeus melastomus*, *M. merluccius* and *Phycis blennoides* in the stomach content of a sixgill shark captured in the Catalan Sea. A spiny dogfish (*Squalus blainvillei*) was found in the stomach of a sixgill shark of 211 cm TOT, captured off the coast of Israel (Ben-Tuvia, 1971). Stomach contents of 23 sixgill sharks, captured in the eastern Sicilian waters, were dominated by bony fishes (61%), cephalopods (13%), decapod crustaceans (9%), chondrichthyans (4%) and echinoderms (4%) (Celona *et al.*, 2005). According to Kabasakal (2004), the main prey of *H. griseus* in Turkish waters were bony fishes.

Ebert (1994) reports on a close relationship between feeding of sixgill sharks and their length in South African waters. Main preys of the specimens over 200 cm TOT were marine mammals and bony fishes. In the present study, highly active and large preys such as swordfish (*Xiphias gladius*), tuna (Scombridae) and dolphin (Delphinidae) were found only in the stomach contents of sixgill sharks  $\geq 500$  cm TOT (Tab. 1). This indicates a clear improvement in the hunting skills of the predator with the increased length.



**Fig. 3: The seasonality of captures of *H. griseus* in Turkish waters.**

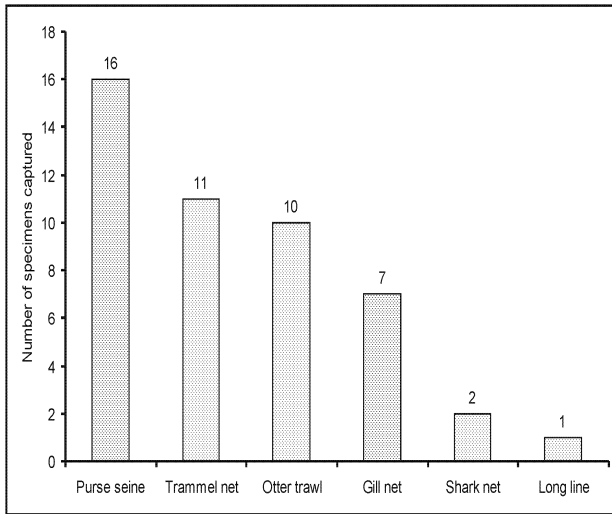
**Sl. 3: Meseci, v katerih so bili vzdolž turške obale ujeti morski psi šesteroškrjarji.**

### Sex ratio and reproduction

Of the 60 sixgill sharks, 28 were females, 11 males and 21 of unknown sex. The sex ratio was 1:2.54 in favour of the females. This numerical dominance of females may indicate some form of sex segregation, although several adults would be required before such conclusion could be drawn.

Most of the sixgill sharks examined during the present study were eviscerated, which is the reason why gonads were not examined. The maturation state of the 21 sixgill sharks was therefore determined on the basis of the data by Capapé *et al.* (2004). According to Capapé *et al.* (2004), the Mediterranean male sixgill sharks over 300 cm TOT and females over 400 cm TOT are considered adults. Thus, the male specimen No. 9 (450 cm TOT) and females Nos. 2, 3, 4, 7 and 11 (450, 523, 500, 600 and 500 cm TOT, respectively) were considered sexually mature specimens. Based on the data by Capapé *et al.* (2004), we can on the other hand suppose that the specimen Nos. 8, 15 and 21 (500, 450 and 450 cm TOT, respectively) were also sexually mature, although their sexes were unknown.

According to Kabasakal (2004), female *H. griseus* gives birth between October and the end of February in the northern Aegean Sea and Sea of Marmara, with the young sixgill sharks occurring in coastal waters. In the present study, two young sixgill sharks (Nos. 5 and 12) were captured at depths  $\leq 75$  m, although more data would be required to get a better insight into the coastal occurrence of *H. griseus* in Turkish waters.



**Fig. 4:** Types of fishing gear and the number of by-caught sixgill sharks. The graph is based on the data of the present study and Kabasakal (2004).

**Sl. 4:** Ribolovna orodja in število po naključju ujetih morskih psov šesteroškrgarjev. Diagram sloni na podatkih pričujoče raziskave in študije Kabasakala (2004).

## CONCLUSIONS

Regarding the geographical situation of Turkey, the waters that surround the country, *i.e.* the Mediterranean, Aegean, Marmara and Black Seas, provide an advantageous location for investigating the distribution of sharks. In the easternmost part of the Levantine Basin – İskenderun and Mersin Bays – the area contains some tropical species due to Lessepsian migration (Bilecenoğlu *et al.*, 2002); while almost the entire volume of the Black Sea consists of a brackish water body, where the oceanographical features of the area have been considered as limiting for the dispersal of sharks in the past (Akşiray, 1987).

Although the first records on the presence of *H. griseus* in Turkish waters dates back to the beginning of the 20<sup>th</sup> century (Ninni, 1923), investigations on the distribution and biology of sixgill shark has been intensified during the last decade. These recent studies yielded very important results, for example, the distributional data of the sixgill shark along the Anatolian coast of the Aegean and Mediterranean Seas, while those from Marmaric

waters were updated and those on the species' Pontic occurrence clarified. Today, our knowledge of the sixgill shark from Turkish waters is much greater than ever before and we are doing everything to increase it still further.

As in many other shark species, the study of *H. griseus* has been neglected on the account of commercially more important bony fishes. *H. griseus* is not consumed by humans in Turkey. It is a rare by-catch by Turkish fishermen and incidentally captured specimens are generally landed for display. Public interest in large sharks is the main reason of landings, in addition to fishermen anticipating an extra benefit from incidentally captured sharks. However, in most cases the displayed sixgill sharks are discarded in a couple of days, due to their rapid putrefaction. Incidental captures of sixgill sharks create artificial fishing pressures on the species, which also persist between May and August, the prohibited season of fishery. Insensitivity of both public and fisheries' authorities to the conservation of sharks is still present in Turkey. One of the main reasons of this circumstance is the absence of biological information, relevant to set regulations for the management of shark fishery in Turkish waters. Sixgill shark is considered "vulnerable" in the published Red List of IUCN/SSG (Soldo, 2003). Therefore, the author expects that results of the recent research will contribute to the implementation of an effective conservation strategy for *H. griseus* as soon as possible.

## ACKNOWLEDGMENTS

The author wishes to thank Dr. Alessandro De Madalena, Milan, Italy (Italian Great White Shark Data Bank) for sharing his knowledge on sixgill sharks captured in the eastern Sicilian waters, and to Mrs. Ünsal Karhan, for the illustration of the map presented in Figure 1. Special thanks are due to Mrs. Elif Kabasakal for her kind cooperation and patience during the field surveys. During the last 10 years, many fishermen, particularly the crews of fishing trawlers ŞEKERBABA 2, TEKİRDAĞ 1 and ASLAN KAPTAN, have greatly supported the investigations of elasmobranchs in Turkish waters. The author dedicates this article to these gallant fishermen.

## RAZŠIRJENOST IN BIOLOGIJA MORSKEGA PSA ŠESTEROŠKRGARJA, *HEXANCHUS GRISEUS* (BONNATERRE, 1788) (CHONDRICHTHYES: HEXANCHIDAE), V TURŠKIH VODAH

Hakan KABASAKAL

Ichthyological Research Society, Atatürk mahallesi, Menteşo ğlu caddesi, İdil apt., No: 30/4, Ümraniye, TR-34764 İstanbul, Turkey  
E-mail: hakankabasakal@hotmail.com

### POVZETEK

*Hexanchus griseus* (Bonnaterre, 1788) je redka prilovna vrsta v turških vodah. Avtor podaja razmerje med celotno dolžino in težo pri morskih psih šesteroškrjarjih, ujetih v turških vodah. Ti morski psi so ujeti predvsem med septembrom in marcem, z vrhuncem v februarju, v izjemnih primerih pa tudi v juliju ( $n = 10$  v obeh mesecih), ko je ribarjenje sicer prepovedano. V obdobju, ko ribolov ni dovoljen, je največ morskih psov šesteroškrjarjev ujetih s protizakonito upravljanimi kočami in mošnjačami, na kopnem pa naključno ujete primerke potem razstavljajo zgolj zaradi atrakcije in zanimanja medijev. To pa seveda pomeni, da je *H. griseus* pod ribolovnim pritiskom skozi vse leto. Morski psi šesteroškrjarji so bili ujeti predvsem z mošnjačami. Njihov glavni plen so sestavljale ribe kostnice, saj so bile najdene v 9 od 12 odprtih želodcev teh morskih psov (75%). Razmerje med spoloma je bilo 1 : 2,5 v korist samic. Ta številčna prevlada samic kaže na obliko spolne segregacije, vendar pa bi potrebovali več odraslih osebkov, da bi to domnevo lahko tudi potrdili.

**Ključne besede:** *Hexanchus griseus*, morski pes šesteroškrjar, razširjenost, biologija, turške vode, prilov

### REFERENCES

- Akşiray, F. (1987):** Türkiye Deniz Balıkları ve Tayin Anahtarı. İ. Ü. Rektörlüğü Yayınları, No: 3490. İstanbul, 811 pp.
- Barrull, J., I. Mate & M. Bueno (1999):** Observaciones de tiburones (Chondrichthyes Euselachii) en aguas de Cataluña (Mediterraneo No), con algunos aspectos generales de su ecología. *Sci. Gerund.*, 24, 127–151.
- Barrull, J. & I. Mate (2000):** Biología de la cañabota, *Hexanchus griseus* (Bonnaterre, 1788) en el Mar Mediterraneo. *Bol. Asoc. Esp. Elasm.*, 3, 13–20.
- Ben-Tuvia, A. (1971):** Revised list of the Mediterranean fishes of Israel. *Isr. J. Zool.*, 20, 1–39.
- Bilecenoglu, M., E. Taskavak, S. Mater & M. Kaya (2002):** Checklist of the marine fishes of Turkey. *Zootaxa* 113. Magnolia Press, Auckland, 194 pp.
- Bini, G. (1967):** Atlante dei Pesci delle Coste Italiane. Vol. I. Leptocardi-Ciclostomi-Selachi. Mondo Sommerso, Roma, 206 pp.
- Boeseman, M. (1984):** Hexanchidae. In: Whitehead, P. J. P., M.-L. Bauchot, J. C. Hureau, J. Nielsen & E. Tortonese (eds.): *Fishes of the North-eastern Atlantic and the Mediterranean*. Vol. 2. UNESCO, Paris, p. 72–75.
- Capapé, C. (1977):** Liste commentée des sélaciens de la région de Toulon (de La Ciotat à Saint-Tropez). *Bull. Mus. Hist. Natl. Marseille*, 37, 5–9.
- Capapé, C., J. A. Tomasini & J. P. Quignard (2000):** Les elasmobranches pleurotrèmes de la côte du Languedoc (France méridionale): observations biologiques et démographiques. *Vie Milieu*, 50, 123–133.
- Capapé, C., O. Guélorget, J. Barrull, I. Mate, F. Hemida, R. Seridji, J. Bensaci & M. N. Bradai (2003):** Records of the Bluntnose six-gill shark, *Hexanchus griseus* (Bonnaterre, 1788) (Chondrichthyes: Hexanchidae) in the Mediterranean Sea: a historical survey. *Annales, Ser. Hist. Nat.*, 13(2), 157–166.
- Capapé, C., F. Hemida, O. Guélorget, J. Barrull, I. Mate, J. Ben Souissi & M. N. Bradai (2004):** Reproductive biology of the Bluntnose sixgill shark *Hexanchus griseus* (Bonnaterre, 1788) (Chondrichthyes: Hexanchidae) from the Mediterranean Sea: a review. *Acta Adriat.*, 45(1), 95–106.
- Carus, J. V. (1889–1893):** *Prodromus Faunae Mediterraneae*. Vol. II. Brachiostomata, Mollusca, Tunicata, Vertebrata. E. Schweizerbart'sche Verlagshandlung, Stuttgart, 854 pp.

- Celona, A., A. De Maddalena & T. Romeo (2005):** Bluntnose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788), in the eastern north Sicilian waters. *Boll. Mus. Civ. Sci. Nat. Venezia*, 56, 137–151.
- 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. Part 1. Hexanchiformes to Lamniformes. FAO Fish. Synop., 4, 1–249.
- Cugini, G. & A. De Maddalena (2003):** Sharks captured off Pescara (Italy, western Adriatic Sea). *Annales, Ser. Hist. Nat.*, 13(2), 201–208.
- Ebert, D. A. (1986):** Biological aspects of the sixgill shark, *Hexanchus griseus*. *Copeia*, 1, 131–135.
- Ebert, D. A. (1994):** Diet of the sixgill shark *Hexanchus griseus* off southern Africa. *S. Afr. J. Mar. Sci.*, 14, 213–218.
- Golani, D. (1997):** Handbook of the Fishes of Israel. Keter Publishing House, Jerusalem, 269 pp. (in Hebrew)
- Kabasakal, H. (1998):** The first record of the bluntnose six-gill shark (*Hexanchus griseus* (Bonnaterre, 1788)) in the Sea of Marmara. *Acta Adriat.*, 39(1), 67–70.
- Kabasakal, H. (2004):** Preliminary observations on the reproductive biology and diet of the Bluntnose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788) (Chondrichthyes: Hexanchidae), in Turkish Seas. *Acta Adriat.*, 45(2), 187–196.
- Kabasakal, H. (2005):** Pontic occurrence of the bluntnose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788) (Chondrichthyes: Hexanchidae). *Annales, Ser. Hist. Nat.*, 15(1), 65–68.
- Kabasakal, H. & E. Kabasakal (2004):** Sharks captured by commercial fishing vessels off the coast of Turkey in the northern Aegean Sea. *Annales, Ser. Hist. Nat.*, 14(2), 171–180.
- Lipej, L., A. De Maddalena & A. Soldo (2004):** Sharks of the Adriatic Sea. Knjižnica Annales Majora, Koper, 254 pp.
- Ninni, E. (1923):** Primo contributo allo studio dei pesci e della pesca nelle acque dell'impero Ottomano. Missione Italiana per l'Esplorazione dei Mari di Levante. Premiate Officine Grafiche Carlo Ferrari, 187 pp.
- Quignard, J.-P. & C. Capapé (1972):** Complement à la liste commentée des selachiens de Tunisie. *Bull Inst Natl Sci Tech Oceanogr Pêche Salammbô*, 2, 445–447.
- Riedl, R. (1983):** Fauna und Flora des Mittelmeeres. 3. Neubearb. Paul Parey, Hamburg, 836 pp.
- Soldo, A. (2003):** Status of sharks in the Mediterranean. *Annales, Ser. Hist. Nat.*, 13(2), 191–200.
- Tortonese, E. (1956):** Fauna d'Italia. Leptocardia, Cyclostomata, Selachii. Calderini, Bologna, 334 pp.
- Zhan, H., S. Deng & G. Xiong (1987):** Report on the elasmobranchiate fishes occurring in the outer region of the continental shelf and continental slope in the East China Sea. *Rep. Japan. Group Elasmobranch Stud.*, 24, 16–19.