



Occurrence of Bluntnose Sixgill Shark *Hexanchus griseus* (Bonnaterre, 1788) in Yeşilovacık Bay, Northeastern Mediterranean

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Authors' contributions

This study was carried out in collaboration between all authors. Authors DA and DE is interested in searching and studied the fish fauna of the region, including the subject of the current study and performed the statistical analysis. We measured wrote the first draft of the manuscript. Authors NÇ and MB designed the final study, managed the analyses of the study, author MB managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: In this study, an individual of *H. griseus* was caught from the Mersin Bay and this ichthyologic note presents a new female record of *H. griseus* for Mersin Bay, Mediterranean coast of Turkey. This study aims to contribute to the chronological records of the species in the Mediterranean Sea.

Place and Duration of Study: Yeşilovacık bay is a small bay in the west of Mersin Bay. Yeşilovacık bay which lies at approximately 36°07'n latitude, 33°37'e, longitude and about 143 km Western of in Mersin province, Turkey. Sample: On 19 March 2018 blunthose sixgill shark specimen was measured and then deposited in the Museum of the Systematic, Faculty of Fisheries, University of Mersin.

Methodology: A female specimen of *H. griseus* with a total length (TL) of 350 cm (400 kg) was

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captured by a commercial trawl at a depth around of 280 m of the Yeşilovacık Bay (Northeastern Mediterranean Sea), Turkey. Total length was measured to the nearest 1 mm and the weight of the specimen was determined to the nearest kilogram.

Results: Measurements of the specimen are presented and compared with the previous records of *H. griseus* in the Eastern Mediterranean coast of Turkey (Iskenderun Bay), which are given in Table. The identification was carried out according to the previous report.

Conclusion: To date specific conservation measures are not known for this species for the Northeastern Mediterranean coast of Turkey. Thus, the effect of coastal fishery for sharks should be regularly monitored and protection measures should be taken in this region in order for this shark species to continue their conservation for the next generation.

Keywords: Hexanchidae; shark; Mersin coast; Mediterranean Sea; Turkey.

1. INTRODUCTION

The bluntnose sixgill shark, *Hexanchus griseus* (Bonnaterre, 1788), apex predator of the deep waters, located at the upper trophic level of the food chain, belongs to the family Hexanchidae [1]. It is known that the species inhabits depths of 2500 m in the subtropical regions of the oceans and seas. *H. griseus* usually lives at depths between 180-1100 m [2,3]. It is a deep-water species, which lives in the outer continental and insular shelves and upper slopes. They are found in pelagic areas and upper slopes [4]. Adult specimens are usually below 91 m, while juveniles can be found near the coast [3]. They are found on the bottom during the day. However, they are close to the surface at night to feed. They usually feed on sharks, rays, chimaeras, bony fish, squids, crabs, shrimps, carrion, and even seals [5]. *H. griseus* is an oceanodrom fish species [6]. This circumglobal species is distributed in tropical and temperate waters, including Eastern Atlantic, Western Atlantic, Western Pacific and Eastern Pacific [7]. The maximum weight reported in the literature is 590 kg [8]. Although maximum total length (TL) reported in the literature is 482 cm according to Compagno [9] and Cervigón et al. [10]. However, the maximum total length of the species reported in the records is 650 cm in the Turkish coast by Kabasakal [11]. Compagno [9] reported individuals of this species reach the reproduction maturity in the range of 300-482 cm in TL. Although studies on the biological properties of the species are limited, it has been reported that they are ovoviviparous and their fecundity varies between 22 to 108 [1].

The bluntnose sixgill shark, *H. griseus* has been reported from France [12,13], from Italy [14,15], from Israel [16], from Tunisia [17], from Greece [18] in the Mediterranean Sea. There are reports of *H. griseus* from the Pacific [1,19], from the

Indian and Atlantic Oceans [20]. It has been also reported from Turkey waters of the Mediterranean, the Aegean Sea, the Sea of Marmara and Black Sea [21]. According to Kabasakal [11]; first record of this species in the waters of Turkey was reported in 1923 by [22], and the following studies: Devedjian [23]; Konsuloff and Drensky [24]; Ben-Tuvia [16]; Akşiray [25]; Meriç [26]; Goren and Galil [27]; Jones et al. [28]; Kabasakal [21]; Sion et al. [29]; Golani et al. [30]; Kabasakal [31]; Kabasakal [11]; Basusta and Basusta [32].

In this study, an individual of *H. griseus* was caught from the Mersin Bay and this ichthyologic note presents a new female record of *H. griseus* for Mersin Bay, Mediterranean coast of Turkey. This study aims to contribute to the chronological records of the species in the Mediterranean Sea.

2. MATERIALS AND METHODS

2.1 Study Area

Yeşilovacık Bay is a small bay in the west of Mersin Bay (Fig. 1). Yeşilovacık Bay, which lies at approximately 36°07'N latitude, 33°37'E, longitude and about 143 km Western of in Mersin Province, Turkey. The bay is the spawning and breeding area for many bony fish species due to the wide continental shelf. The biodiversity of the Yeşilovacık Bay is affected by the migration of the alien species. Both sides of the bay are surrounded by littoral shores, while sandy beach is located inside. It is covered with the sandy muddy, sediment on the sea floor of the bay. The bay has an anticyclonic gyre opposite to the cyclonic gyre, which the main gyre of the Mediterranean Sea. The maximum depth of the bay is 180 m. The physical and chemical parameters of the Bay are similar to those of the Mediterranean Sea. Tourism, agriculture, fishing

and ship transportation are the main activities in the bay.

2.2 Fish Sampled

On 19 March 2018, a female specimen of *H. griseus* with a total length (TL) of 350 cm (400 kg) was captured by a commercial trawl at a depth around of 280 m off the Yeşilovacık Bay (Northeastern Mediterranean Sea), Turkey (Fig. 1).

Total length was measured to the nearest 1 mm and the weight of the specimen was determined to the nearest kilogram. The head and fins of the

specimen were deposited in the Museum of the Systematic, Faculty of Fisheries, Mersin University, (MEUFC-18-11-058) (Fig. 2).

3. RESULTS

In this study, a female individual was captured from the Mediterranean waters of Turkish coast (Mersin Bay). The identification was carried out according to Compagno [9]. Some measurements of the specimen are presented and compared with the previous records of *H. griseus* in the Eastern Mediterranean coast of Turkey (Iskenderun Bay), which are given in Table 1.

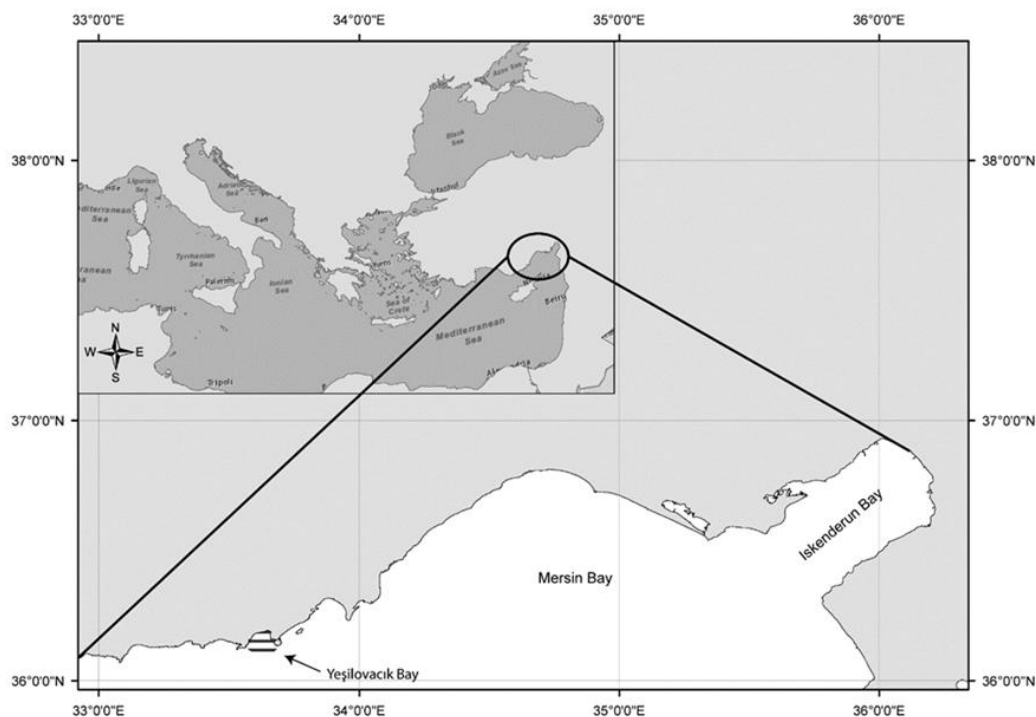


Fig. 1. The shaded area indicates the location where the specimen of *H. griseus* was caught from Mersin Bay



Fig. 2. Female specimen of *H. griseus* caught from Mersin Bay

Table 1. Comparison of measurements of the bluntnose sixgill shark specimen (*H. griseus*) from Mersin Bay (Northeastern Mediterranean, Turkey) with previous record in the Iskenderun Bay (Eastern Mediterranean, Turkey)

Specimen	This study		Başusta and Başusta (2015)	
	n=1		n=1	
Sex	Female		Male	
Measurements	Length (cm)	Ratio (TL%)	Length (cm)	Ratio (TL%)
TL-Total Length)	350.0	100.00	213.0	100.00
FL-Fork Length	271.8	77.66	165.4	77.65
PCL-Precaudal Length	245.1	70.04	149.2	70.05
HDL-Head Length)	53.2	15.20	32.4	15.21
PNL-Prenarial Length	18.5	5.30	11.3	5.31
EYL -Eye Length	12.0	3.41	7.3	3.43
CDM-Dorsal Caudal Margin	101.8	29.09	62.0	29.11
DL-Dorsal Length	22.1	6.32	13.5	6.34
DH-Dorsal Height	23.0	6.55	14.0	6.57
CLI-Clasper Inner Length	-	-	7.3	3.43
BH-Body Height	37.7	10.68	23.0	10.80
Weight (kg)	400	-	480	-

The species possesses six pairs of gill slits, a sub-terminal mouth and a short, broadly rounded blunt snout. It is gray with or without irregular brown spots. Also, the distance from the dorsal fin to the caudal fin is equal to the length of the dorsal fin base [9].

The color of fresh specimen was dark gray without spots on the back and white on the belly, with no clear boundary between the two colors.

4. DISCUSSION

The bluntnose sixgill shark, *H. griseus* is not a commercial species due to the fact that it is a deep-water species and it is difficult to capture. However, it can also be sold for commercial purposes when caught by commercial fishermen [1]. Although *H. griseus* is found in deep waters (1-2500 m), it can come up to shallow waters (50-100 m) [11]. Individuals of this species are usually caught during the fishing activities in coastal waters. In this study, the reported individual was caught at a depth of 280 m.

The size at birth is 56 to 70 cm and the total length of the species is usually 300 cm [10]. Females mature at about 300 to 482 cm and males at about 300 to 350 cm [9,33,34]. Kabasakal [11] reported 6 female individuals of *H. griseus* with a total length of 350 cm were caught between in October-April from Taşucu and Kaş. In the same period, the presence of a large number of mature female individuals in the same region may indicate that they came for breeding purposes. The total length of the

individual caught in this study was 350 cm and it was a mature individual. It was evaluated that this individual may have reached shallow waters in the same period with the purpose of reproduction.

The bluntnose sixgill shark commonly feeds on *Squalus* spp., sharks, rays, bony fish, crabs, shrimps, carrion, and seals [9,20,35]. In this study, a large number of bony fish species were found in the stomach contents. In addition, shark (*Squalus* spp.), *Galeus melastomus* and some species of rays (*Dipturus oxyrinchus*), as well as cans and plastic remains were found. Similar Barrull and Mate [36] reported that *Scyliorhinus canicula*, *G. melastomus*, *Merluccius merluccius* and *Phycis blennoides* were found in the stomach contents of six shark samples caught in the Catalan Sea. Celona et al. [37] reported the stomach contents of 23 specimens captured in Eastern Sicilian waters mainly consist of bony fish (60.87%), cephalopods (13.04%), decapod crustaceans (8.7%), cartilaginous (4.35%) and echinoderms (4.35%).

According to Ebert [20] the main prey of individuals over 200 cm of *H. griseus* in the coasts of South Africa is composed of bony fish. Consumption of sharks and sea mammals has been reported to be associated with their lengths. In this study, the main prey of the captured individual (350 cm, TL) formed bony fish. This finding is consistent with the literature.

The bluntnose sixgill shark has several records in the Mediterranean Sea, Turkey [11]. 150 individuals of *H. griseus* were caught from the Turkish coastal waters between 1963-2013 years by commercial fishermen. 90 specimens from the Marmara Sea, 41 specimens from the Turkish coastal waters of the Aegean Sea, 15 specimens from the Turkish coastal waters of Mediterranean Sea and 3 specimens from the Turkish coastal waters of the Black Sea and 1 specimen from the Dardanelles were reported [11]. After 2013, 2 individuals have been reported from Mediterranean coasts of Turkey [32,38].

To date, there is little information available about habitat, ecology, and population of *H. griseus*. This species is listed as Near Threatened (NT) in the Global Red List of the International Union for Conservation of Nature, IUCN [39,40] and also by CITES [41]. Therefore, this record is significant and the species could be considered as exceptionally rare in the Mediterranean, Turkey.

The bluntnose sixgill shark is a species that has not been economically important because it is not a species offered for human consumption, but marketed for human consumption when it is caught in the nets by fishermen in some regions. The fishermen do not like this shark species because they can damage the economically important seafood. The pressure in the species on the economic species is neglected in the scientific researches. However, fishermen should be encouraged to release the sharks caught by mistake. This is an important move in terms of conservation of species and improvement of fisheries management.

5. CONCLUSION

This predator species in the upper trophic levels of the food chain are found to be few in number, their distribution in deep waters and the difficulties in catching them therefore limit the biological studies related to the species. These individuals, which are accidentally caught by the fishermen and come to the shallow waters for breeding purposes, enable the study of the species for scientific purposes. This situation is not preferred for commercial fishermen because they cannot market this species economically to the people of our country. Therefore, fishermen can be more easily encouraged to release the captured *H. griseus* into the water.

To date specific conservation measures are not known for this species for the Northeastern Mediterranean coast of Turkey. Thus, the effect of coastal fishery in sharks should be regularly monitored and protection measures should be taken in this region in order for this shark species to continue their conservation for the next generation.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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