

RECENT RECORDS OF THE GREAT WHITE SHARK, *CARCHARODON CARCHARIAS* (LINNAEUS, 1758) (CHONDRICHTHYES: LAMNIDAE), IN TURKISH WATERS (EASTERN MEDITERRANEAN)

Hakan KABASAKAL & Erdi BAYRI

Ichthyological Research Society, Tantavi mahallesi, Menteşoğlu caddesi, İdil apt., No: 30, D: 4, Ümraniye, TR-34764 İstanbul, Turkey
E-mail: kbasakal.hakan@gmail.com

Eylül ATAÇ

Ege University, Fisheries Faculty, İzmir, Turkey

ABSTRACT

*Between January 2016 and April 2018, 3 juvenile great white sharks, *Carcharodon carcharias* (Linnaeus, 1758), were incidentally captured in the coastal waters of the Turkish Aegean Sea. Journeys of young-of-the-year (YOY) and juvenile specimens can increase the risk of their encountering fishing gears if the specimens head for regions where the fishery of the great whites is not banned. An understanding of the geographic range and knowledge of the vertical distribution of the YOY and juvenile great whites are therefore necessary to implement a management plan for great white populations in Turkish waters and to reduce the incidental fishing mortality of this vulnerable top predator.*

Key words: Great white shark, *Carcharodon carcharias*, conservation, nursery, distribution

RECENTI RITROVAMENTI DEL GRANDE SQUALO BIANCO, *CARCHARODON CARCHARIAS* (LINNAEUS, 1758) (CHONDRICHTHYES: LAMNIDAE), IN ACQUE TURCHE (MEDITERRANEO ORIENTALE)

SINTESI

*Nel periodo tra gennaio 2016 e aprile 2018, 3 giovani esemplari del grande squalo bianco, *Carcharodon carcharias* (Linnaeus, 1758), sono stati catturati accidentalmente nelle acque costiere del mar Egeo turco. Gli spostamenti degli esemplari che non hanno ancora raggiunto il primo anno di età (YOY) e degli stadi giovanili possono aumentare il rischio di incontrare attrezzi da pesca, se gli esemplari si dirigono verso regioni in cui la pesca dei grandi squali bianchi non è vietata. Una comprensione dell'estensione geografica e la conoscenza della distribuzione verticale degli esemplari YOY e degli stadi giovanili della specie sono quindi necessarie per attuare un piano di gestione per le popolazioni del grande squalo bianco nelle acque turche e per ridurre la mortalità causata dalla pesca accidentale di questo vulnerabile predatore.*

Parole chiave: grande squalo bianco, *Carcharodon carcharias*, conservazione, area di riproduzione, distribuzione

INTRODUCTION

The great white shark, *Carcharodon carcharias* (Linnaeus, 1758), has been known in Turkish waters since the Middle Ages (Bellonii, 1553; Kabasakal, 2014). In the 16th-century manuscript, Bellonii (1553) reported a great white shark caught off the İzmir coast (central Aegean Sea). Besides this historical anecdotal record, the majority of data on the occurrence of *C. carcharias* in Turkish waters have been gathered since the 1880s (Kabasakal, 2014, 2016). In a recent review on the historical and contemporary dispersal of the great white shark in Turkish waters, Kabasakal (2016) concluded that 54 specimens were recorded in the mentioned region between 1881 and 2014.

Since *C. carcharias* is a mythic species with the status of endangered large shark in the Mediterranean Sea (Cavanagh & Gibson, 2007), each capture constitutes an ichthyological event of which the world of ichthyology deserves to be informed. In the present article, the authors report on the recent captures of the great white shark in the Aegean Sea, off the Turkish coast,



Fig. 1: *Carcharodon carcharias*, captured on January 2, 2016, in the Bay of Edremit. (Photo: IRS archives).

Sl. 1: Primerek belega morskoga volka, ki je bil ulovljen 2. januarja 2016 v edremitskem zalivu (Foto: arhiv IRS).

which are considered valuable data for the general understanding of the eastern Mediterranean distribution of *C. carcharias*.

MATERIAL AND METHODS

Since the great white shark is an endangered species and protected in certain parts of the Mediterranean Sea (Cavanagh & Gibson, 2007; Serena, 2005), the selection of an appropriate sample for the present study was an instance of typical opportunistic research, consisting in dead animal sampling (Jessup, 2003). A regular screening of social media, local newspapers – both printed and internet based – and recreational fishing websites provided the authors with information on the present incidental captures of great white sharks. All three cases were verified by interviewing fishermen and were considered as confirmed if a properly shot photo of the specimen accompanied the record. For the three specimens, the following data were collected: total length

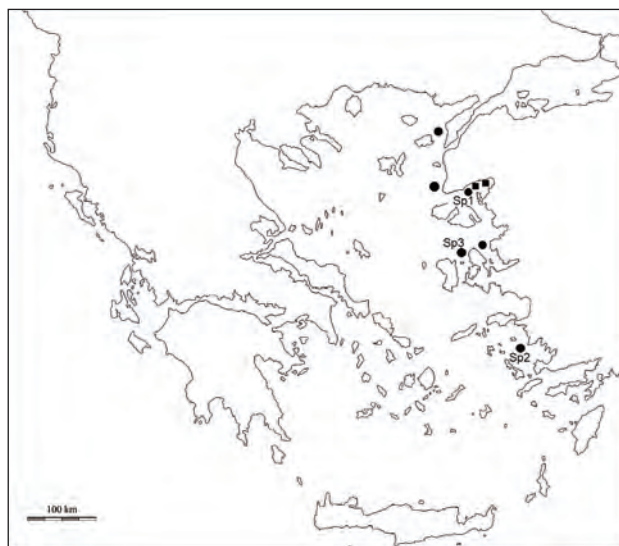


Fig. 2: Capture localities of new-born (■) and juvenile (●) specimens of *Carcharodon carcharias* incidentally captured in Turkish Aegean waters, from previous studies and the present research. Sp. 1: specimen from the present study captured on January 2, 2016, in the Bay of Edremit; Sp. 2: specimen from the present study captured on June 4, 2017, off the Didim coast; and Sp. 3: specimen from the present study captured on April 14, 2018, off the İzmir coast.

Sl. 2: Lokalitete, kjer so bili v turškem delu Egejskega morja naključno ujeti novorojenec (n) in mladostni primerek (l) belega morskoga volka na podlagi podatkov iz predhodnih raziskav in iz pričujoče študije. Sp. 1: primerek iz pričujoče študije, ujet 2. januarja 2016 v zalivu Edremit; Sp. 2: primerek iz pričujoče študije, ujet 4. junija 2017 ob didimski obali; in Sp. 3: primerek iz pričujoče študije, ujet 14. aprila 2018, ob obali Izmirja.

(TL) to the nearest cm, weight (W) to the nearest gram, sex, gear and capture depth. The photographs of the present specimens, referenced with dates of capture and fishing localities, are preserved in the digital archives of the Ichthyological Research Society (IRS).

RESULTS AND DISCUSSION

On January 2, 2016, a female great white shark (Sp. 1; Fig. 1) got entangled in a coastal stationary net in the Bay of Edremit (northeastern Aegean Sea; Fig. 2). The total length of the shark was 175 cm. The dried head, jaws and caudal fin of the specimen are preserved by local fishermen in Altınoluk province. A male great white shark (Sp. 2; Fig. 3), measuring 200 cm in total length and weighing 60 kg, was captured by a commercial purse-seiner off the Didim coast (central Aegean Sea; Fig. 2) on June 4, 2017. On April 14, 2018, a female great white shark (Sp. 3; Fig. 4), was captured by a coastal stationary-netter, off the İzmir coast (central Aegean Sea; Fig. 2), and the total length of the specimen was 180 cm. After being displayed at the fishmonger's for a few days, specimens 2 and 3 were discarded, and



Fig. 3: *Carcharodon carcharias*, captured on June 4, 2017, off the Didim coast. (Photo: IRS archives).
Sl. 3: *Primerek belega morskega volka, ki je bil ulovljen 4. junija 2017 ob didimski obali* (Foto: arhiv IRS).

no body parts were preserved to be available for further inspection.

Based on previous records (n = 54; Kabasakal, 2016) and the results of the present study, 57 specimens of *C. carcharias* were recorded in Turkish waters from the 1880s to date. In a recent inventory study, De Maddalena & Heim (2012) provided the details of 596 great white sharks recorded in the entire Mediterranean Sea and adjacent waters. Following Boldrocchi *et al.* (2017), who recently reviewed the distribution, ecology and status of great white sharks in the Mediterranean Sea, at least 629 great white sharks were recorded in the mentioned region between 476 and 2015. Therefore, the 57 specimens of *C. carcharias* recorded in Turkish waters represent 9% of all Mediterranean records of the great white shark. Based on the available data, it is safe to presume that the great white shark is a regular seasonal visitor of Turkish waters, and that a possible breeding and nursery ground is located in the central-northern Aegean Sea (Kabasakal 2014, 2016).

Specimens of the great white sharks examined in the present research were juveniles and incidentally captured in coastal waters. Along the Aegean coast of Turkey, coastal fishery possibly puts a threatening pressure on the survival of young great white sharks, which was also suggested by previous studies (Kabasakal & Gedikoğlu, 2008; Kabasakal & Kabasakal, 2015; Kabasakal *et al.*, 2009) and confirmed by the results of the present study.

Referring to the map depicted on Figure 2, capture localities of young-of-the-year (YOY) and juvenile great white sharks extend over a wide area from northern to southern parts of the Aegean Sea. Although the juvenile specimens were captured over the entire region, YOY specimens were only captured in the waters of the Bay of Edremit (Fig. 2). Therefore, based on the data on the occurrence of YOY and juvenile great white sharks in Turkish waters (Kabasakal, 2014, 2016; results of the present study), the Bay of Edremit can be considered as a breeding ground of *C. carcharias*, where pregnant females give birth to pups between late spring and midsummer, then the juveniles move to a wider nursery region that extends along almost the entire Turkish coast of the Aegean Sea (Fig. 2). Based on the captures of pregnant females with developing or near-term embryos, and juvenile specimens, Saidi *et al.* (2005) and Rafrafi-Nouira *et al.* (2015) suggest that central Mediterranean off the Tunisian coast could be considered as a possible nursery area for *C. carcharias*, as well. In a previous study focused on the movements, behaviour and habitat preferences of juvenile specimens of *C. carcharias* in the eastern Pacific, Weng *et al.* (2007) reported that YOY great white sharks can travel over 700 km in a few months. Weng *et al.* (2007) suggest that journeys of YOY and juvenile specimens can increase the risk of them encountering fishing gears if the specimens head for regions where the fishery of the great whites is not banned. To conclude, an un-



Fig. 4: *Carcharodon carcharias*, captured on April 14, 2018, off the İzmir coast. (Photo: IRS archives).

Sl. 4: *Primerik belega morskega volka, ki je bil ulovljen 14. aprila 2018 ob izmirski obali* (Foto: arhiv IRS).

derstanding of the geographic range and knowledge of the vertical distribution of the YOY and juvenile great whites are necessary to implement a management plan for great white populations in Turkish waters and to reduce the incidental fishing mortality of this vulnerable top predator.

ACKNOWLEDGEMENTS

Authors wish to thank the fishermen, who kindly provided support in the field surveys of great white shark research, carried out by Ichthyological Research Society (İstanbul) since 2000. The first author extends special thanks to his wife, Özgür, and his son, Derin, for their endless love and patience.