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TWO RECENT RECORDS OF THE GREAT WHITE SHARKS, *CARCHARODON CARCHARIAS* (LINNAEUS, 1758) (CHONDRICHTHYES: LAMNIDAE), CAUGHT IN TURKISH WATERS

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ABSTRACT

The status of the great white shark, Carcharodon carcharias (Linnaeus, 1758), in Turkish waters has always been a point of controversy. In 1967 and 1991, two great white sharks were captured in the Sea of Marmara and in the Aegean Sea, respectively, which have never been reported in the literature. The recently developed tuna farm industry along the Turkish coast of the Mediterranean and Aegean Seas can increase the possibility to encounter great white sharks, and this fact necessitates certain monitoring of the interactions between the white sharks and fishing activities.

Key words: great white shark, *Carcharodon carcharias*, captures, Turkish seas, Mediterranean Sea

DUE CATTURE RECENTI DEL GRANDE SQUALO BIANCO, *CARCHARODON CARCHARIAS* (LINNAEUS, 1758) (CHONDRICHTHYES: LAMNIDAE), IN ACQUE DELLA TURCHIA

SINTESI

Lo stato del Grande squalo bianco, Carcharodon carcharias (Linnaeus, 1758), in acque delle Turchia, ha sempre suscitato molte controversie. Nel 1967 e nel 1991 due grandi esemplari di questa specie sono stati catturati rispettivamente nel Mar di Marmara e nel Mar Egeo, ma le catture non sono mai state riportate in letteratura. L'avvio recente dell'allevamento industriale di tonno lungo la costa turca nei mari Mediterraneo ed Egeo può incrementare la possibilità di incontrare il Grande squalo bianco, e tale fatto necessita di un monitoraggio delle interazioni fra gli squali bianchi e le attività di pesca.

Parole chiave: Grande squalo bianco, *Carcharodon carcharias*, catture, acque della Turchia, mare Mediterraneo

INTRODUCTION

The status of the great white shark, *Carcharodon carcharias* (Linnaeus, 1758), in Turkish waters has always been a point of controversy, whether this enormous predatory shark is present along the Anatolian coast. Although the great white shark has been mentioned by some previous researchers (e.g., Devedjian, 1926; Akşiray, 1987; Mater & Meriç, 1996), there are still uncertainties regarding the historical or contemporary records of *C. carcharias* in Turkish seas. Recently, Kabasakal (2003) reported the historical records of 15 great white sharks, caught or sighted by the bluefin tuna handliners in the Sea of Marmara, between 1881 and 1985. Furthermore, 3 great white sharks, caught or sighted along the Turkish coast of the northern Aegean Sea were reported by Kabasakal & Kabasakal (2004).

In the present study, two captures of the great white shark in 1967 and 1991, in the Sea of Marmara and in the Aegean Sea, respectively, are reported, with the status of *C. carcharias* in Turkish seas discussed.

MATERIAL AND METHODS

The present study is a part of the extensive research to figure out the current status of the sharks of Turkish waters, which was initiated in 2000 by Ichthyological Research Society (IRS; KANIT Project –*Türk Sularında Yaşayan Köpekbalıklarının Tesbiti Projesi* [Identifying the Sharks of Turkish Waters]; KANIT means "proof" in Turkish). Documents regarding the captures of two great white sharks were donated to IRS by Mr. Ateş Evirgen, an underwater photographer, and Mr. M. Necati Karmanoğlu, a diver. During this research, photos documenting two captures of white sharks were found. These images were published in Baldrige (1976) (specimen No. 1) and in a daily newspaper (specimen No. 2). The examined materials are kept in the archives of IRS and available for inspection on request.

RESULTS

Specimen No. 1

The first specimen (Fig. 1) was caught by a tuna handliner off the southern coast of Büyükada (Fig. 3), in 1967. Identification of this specimen as *C. carcharias* is based on the following characters: the triangular teeth, the black mark on the tip of the lower surface of the pectoral fin, and the robust and massive body. Regarding the explanation accompanying the photograph of specimen No. 1, which is written as "Turkish fishermen struggled for thirteen hours to catch this monster... ..on the shores of the Bosphorus", the catch site is not correct. This great white shark was hooked off the southern coast of Büyükada – one of the two main fishing areas of *C.*

carcharias in the Sea of Marmara, reported by Kabasakal (2003) – and after a long struggle, it was landed on the southeastern coast of Bosphorus, near Salacak pier, a fishing village reputed for tuna handliners during the 20th century.

The hook protruding from the lower jaw of the great white shark seen in figure 1 is a typical long-shank shark hook. The length of this type of hooks usually varied between 30 to 40 centimetres; however, during the days of tuna handling in Bosphoric and Marmaric waters, fishermen used to use regular tuna hooks, with the length not exceeding 20 centimetres (Mengi, 1977). For this reason, those fishermen seemed to have gone to sea for the targeted capture of a large shark.

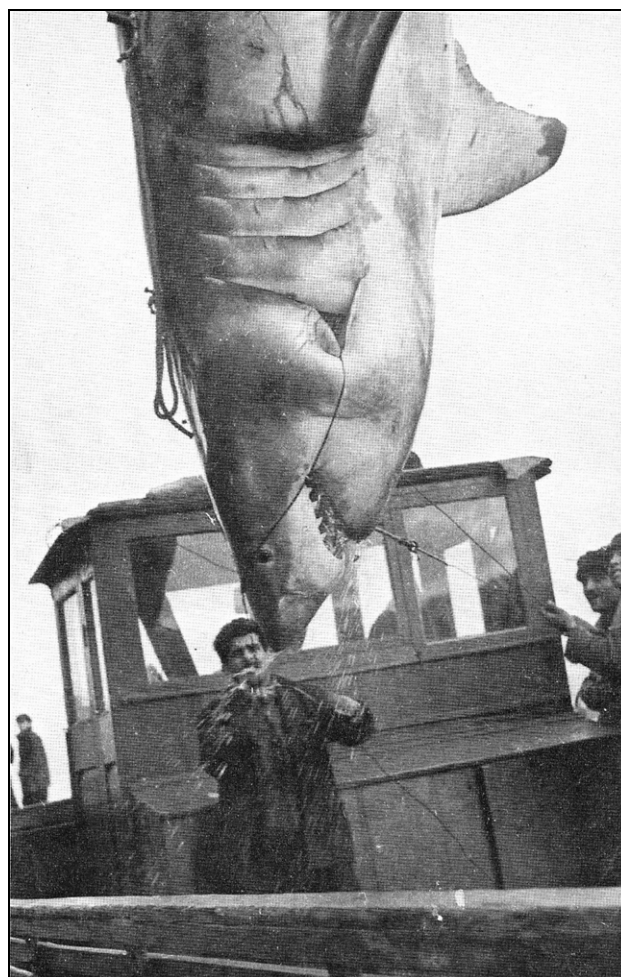


Fig. 1: Great white shark (*Carcharodon carcharias* Linnaeus, 1758; specimen No. 1) captured in 1967 off Büyükada. (Photo: IRS Archive)
Sl. 1: Beli morski volk (*Carcharodon carcharias* Linnaeus, 1758; primerek št. 1), ujet leta 1967 v bližini Büyükade. (Foto: Arhiv IRS)



Fig. 2: Page of the newspaper reporting the capture of a great white shark (specimen No. 2) on March 18, 1991, off Foça. (Photo: IRS Archive)

Sl. 2: Časopisna stran s poročilom o belem morskem volku (primerek št. 2), ujetem 18. marca 1991 v bližini Foča. (Foto: Arhiv IRS)

Specimen No. 2

The second specimen (Fig. 2) was caught by a commercial purse-seiner, "Necipoğlu 2", off the coast of Foça (Fig. 3) on 18 March 1991. Identification of this specimen as *C. carcharias* is based on the following characters: a triangular upper tooth, the shape of snout and mouth, and the size of the gill slits. According to the report seen in the newspaper, the shark's total length was estimated at ca. 5 m and its weight at 3,500 kg; however, the weight of the shark seems to be overestimated. The fishermen tried to lift the shark by means of a crane of 1,500 kg maximum capacity, but during the first trial the lifting wire broke off. Thus, the weight of the specimen No. 2 should be at least 1,500 kg, which seems more accurate than the reported weight. After the capture, the great white shark was transported to İstanbul Fish Market for auction. Here, the shark was eviscerated; a tuna fish, ca. 1 m long, was found in the stomach contents.

DISCUSSION

The historical and contemporary occurrences of *C. carcharias* in the Mediterranean basin have been subjected to several investigations (Barrull, 1993–94; Fergusson, 1996; De Maddalena, 2000; Barrull & Mate, 2001; Celona, 2002; De Maddalena, 2002; Kabasakal, 2003;

Morey *et al.*, 2003). According to Fergusson (1996), Mediterranean distribution of the great white shark is concentrated mainly in the western and central parts of the basin. Comparing the numbers of the great white sharks recorded from the Catalanian Sea (26; Barrull & Mate, 2001), Balearic Islands (27; Morey *et al.*, 2003), northern and central Adriatic Sea (83; De Maddalena, 2000) and the entire western Mediterranean basin and the Adriatic Sea (85; Fergusson, 1996), only 29 great white sharks have been recorded from the eastern Mediterranean, and the adjacent Aegean and Marmara Seas (Ben-Tuvia, 1971; Fergusson, 1996; Kabasakal, 2003; Kabasakal & Kabasakal, 2004). Three of the specimens reported in Fergusson (1996) are also mentioned by Kabasakal (2003), as Bosphoric occurrences of *C. carcharias*. Fergusson (1996) also reported that great white sharks are rare in the Aegean Sea, as well as in the Dardanelles and Bosphorus Straits and in the Sea of Marmara – the so-called Turkish Straits System (TSS).

Historically, great white sharks appear to have been encountered in the TSS irregularly since the early 20th century (Devedjian, 1926). Devedjian (1926) reported on a great white shark (TOT 400 cm) captured in the Sea of Marmara, and added that its stomach content included a number of bonitos. Due to the occurrence of great white shark in the prebosphoric waters of the Black Sea, Slstenenko (1955–56) included *C. carcharias* in the pontic ichthyofauna; however, since the last 50

years, no specimen of *C. carcharias* has been recorded from the area. Although the presence of *C. carcharias* in the Sea of Marmara has been reported by Bilecenoğlu *et al.* (2002) in the *Checklist of the marine fishes of Turkey*, the information given herewith is probably based on previous recordings. Considering that the last sighting of great white shark in Marmaric waters is dated to May 1985 (Kabasakal, 2003), the current presence of *C. carcharias* in the Sea of Marmara is "questionable" and requires confirmation.

Although the Foça specimen of *C. carcharias* (specimen No. 2) was caught on 18 March 1991, the most recent occurrence of an app. 5 m long shark sighted by a diver along the Anatolian coast of the Aegean Sea was dated to May 1999 (Kabasakal & Kabasakal, 2004). With the addition of two specimens recorded in the present study, the total number of great white sharks reported from the eastern Mediterranean and adjacent seas increased to 31, which constitutes 25.2 and 6.5 percent of the total numbers recorded by Fergusson (1996) and De Maddalena (2006) from the entire Mediterranean Sea, respectively. The role played by sea surface temperatures (SSTs) in affecting the distribution of the great white shark is demonstrated in the literature (Fergusson, 1996; Barrull & Mate, 2001; Kabasakal, 2003; Morey *et al.*, 2003). *C. carcharias*, in the Mediterranean Sea, tolerated SSTs ranging from 7.5°C to 25°C, but few records were

reported in waters with a temperature above 23°C (Fergusson, 1996). Kabasakal (2003) reports that accidental captures of *C. carcharias* in the Sea of Marmara reached their peak from November to April, when SSTs ranged from 7°C (November) to 21°C (April). Three great white sharks, reported in Kabasakal & Kabasakal (2004) from the northeastern Aegean Sea, were captured or sighted between March and May, when SSTs ranged from 13 to 18°C (Kocataş & Bilecik, 1992). The exact date of capture of specimen No. 1 is not known, thus I cannot comment on SST during the time of its catch in Marmaric waters. On the other hand, specimen No. 2 was captured on 18 March 1991, when SST in the central Aegean Sea varied between 13 and 14°C (Kocataş & Bilecik, 1992). Fergusson (1996) reports on the capture of three great white sharks along the Greek coast of the Aegean Sea, in July 1951 (SST 20–21.5°C), September 1972 (SST 22–23°C) and December 1984 (SST 13–17°C). Regarding the data presented by Fergusson (1996), Kabasakal (2003) and Kabasakal & Kabasakal (2004), and the results of the present study, eurythermal nature of the great white shark suggests that the species can remain in Aegean and Marmaric waters all the year round.

According to Barrull & Mate (2001), encounters of the great white shark are most common at insular sites and in association with pelagic fisheries for large teleosts such as tuna or swordfish. Although some seasonal differences in the spatio-temporal occurrence of *C. carcharias* can be observed, the species seem to be present around the western Mediterranean islands all the year round (Morey *et al.*, 2003).

Specimen No. 1 was captured off Büyükada Island, where two other great white sharks were caught in 1920 and 1926 (case Nos. 4 & 6 in Kabasakal, 2003). Specimen No. 2 was captured approximately a mile off Uzunada Island near Foça. Kabasakal & Kabasakal (2004) report the capture of a great white shark off the western coast of Bozcaada island in 1996, and the sighting of another specimen by a gill-netter in the same waters. Based on Kabasakal (2003), Kabasakal & Kabasakal (2004) and the present results, *C. carcharias* can be regarded primarily a coastal shark occurring in waters of the continental shelf, where it is captured or sighted in the Seas of Turkey.

Tuna has always been a primary prey for Mediterranean white sharks, and interactions between these apex predators and tuna fishery have been documented in details (Barrull & Mate, 2001; De Maddalena, 2002; Kabasakal, 2003; Morey *et al.*, 2003; Galaz & De Maddalena, 2004). Great white shark has been a by-catch of Marmaric tuna hand-liners, until the decline of tuna stock in the Sea of Marmara in 1980's (Kabasakal, 2003). The recent presence of *C. carcharias* in coastal waters of the Turkish Aegean Sea in the 1990's, can also be inferred from accidental captures by commercial fishing gears deployed for tuna (e.g. purse-seines), as



Fig. 3: Fishing localities (circles) of great white sharks in the Sea of Marmara (specimen No. 1) and in the Aegean Sea (specimen No. 2).

Sl. 3: Lokaliteti (krogca) belih morskih volkov v Marmarskem (primerek št. 1) in Egejskem morju (primerek št. 2).

well as other bony fishes (e.g. gill-nets). One of the white sharks reported by Kabasakal (2004) (specimen caught on March 1996) and specimen of the present study were both captured by commercial purse-seiners, which deployed their nets to entrap tuna schools.

The apparent seasonal distribution of white sharks along Turkish coasts can be related to trophic migrations of prey species, such as tunas and cetaceans. The stomach content of specimen No. 2 contained a ca. 1 m long tuna, as well. Although the tuna stock in Marmaric waters has been declined or even completely depleted (Karakulak & Oray, 1994), the Sea of Marmara is inhabited by a remarkable population of dolphins. In the Mediterranean Sea, large white sharks also feed on cetaceans (Fergusson, 1996; Barrull & Mate, 2001; De Maddalena, 2002; Morey *et al.*, 2003; Celona *et al.*, 2006). Lipej *et al.* (2004) report that in the Adriatic Sea white sharks feed primarily on dolphins, tunas and carrion. Some white sharks, which in pursuit of dolphin schools seasonally migrate between the Aegean and Marmara Seas, can also enter the Marmaric waters.

The recently developed tuna farm industry along the Turkish coast of the Mediterranean and Aegean Seas can increase the possibility of encountering great white sharks. According to the crew of a towing boat belonging to a Turkish tuna farm, at least one non-fatal shark attack by an unidentified species was experienced by a diver, checking and/or repairing the net (A. Evirgen, *pers. comm.*). The attack took place off northern Cyprus, while the towing boat was on the way to Çeşme (Turkish coast of the central Aegean Sea). There have been sev-

eral unverified reports of sharks being captured in tuna tow cages and in inshore tuna farm cages (Galaz & De Maddalena, 2004). Whether the shark trapped in a tuna cage is a white shark or not, attempt to remove a large predator from a tuna cage is a difficult and dangerous task. Due to notable risk to the people on board, fishermen usually decide to kill the shark.

The white shark is a protected species. Due to the vulnerable status of white sharks in the Mediterranean Sea, it is included in Appendix 2 of Bern Convention; Appendix 2 of Barcelona Convention. It is also considered vulnerable by IUCN and FAO, and proposed for CITES listing on Appendix I and II (Serena, 2005). Contrary to international efforts for protecting *C. carcharias*, there have been no attempts to set regulations for the conservation of the species in Turkish waters. In ecological terms, white shark is a '*k-selected*' species – slow growth, late maturation and low fecundity, which means that once the population of the white shark is overfished, it would take many years to recover. Taking into consideration all these facts, an extensive research should be carried out to figure out the current status of the great white shark in Turkish waters, as well as monitoring of the interactions between the species and fishing activities.

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DVA NOVEJŠA PODATKA O BELEM MORSKEM VOLKU *CARCHARODON CARCHARIAS* (LINNAEUS, 1758) (CHONDRICHTHYES: LAMNIDAE), UJETEM V TURŠKIH VODAH

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POVZETEK

Status belega morskega volka Carcharodon carcharias (Linnaeus, 1758) v turških teritorialnih vodah je že od nekdanj sporen. Leta 1967 in 1991 sta bila v Marmarskem oz. Egejskem morju ujeta dva osebkta te vrste, o katerih pa v literaturi doslej še ni bilo zaslediti nobenih podatkov. Nedavno odprte farme za industrijsko gojenje tunov vzdolž turškega obrežja v Sredozemskem in Egejskem morju utegnejo povečati možnost pojavljanja belih morskih volkov, in prav zaradi tega dejstva bi bil po avtorjevem mnenju potreben temeljit monitoring interakcij med belimi morskimi volkovi in ribiškimi dejavnostmi.

Ključne besede: beli morski volk, *Carcharodon carcharias*, ujeta primerka, turške vode, Sredozemsko morje

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