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SHORT COMMUNICATION

Recent observations on sandbar shark *Carcharhinus plumbeus* (Carchardinidae) around sea cages of fish farms in Iskenderun Bay (Türkiye, eastern Mediterranean Sea)

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Abstract

About ten specimens of the sandbar shark, *Carcharhinus plumbeus*, were observed beneath a fish farm sea-cage off the Arsuz coast in Iskenderun Bay, northeastern Mediterranean Sea, on 15 October 2021. Sandbar sharks have been reported to aggregate around fish farms when the seawater temperature reaches >24°C swimming around cages in groups of 10-20 individuals. During the cleaning of the bag, which is attached to the bottom part of the cage to collect the dead reared fish, sandbar sharks were observed to approach the diver and sporadically attempted to attack the cage, as well.

Keywords: Sandbar shark, foraging behaviour, attack, Levantine Basin

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The sandbar shark, *Carcharhinus plumbeus* (Nardo, 1827), is a medium-sized active swimming shark displaying a circumglobal distribution in tropical and temperate seas, except for the eastern Pacific (Golani *et al*. 2006; Rigby *et al*. 2021). It is defined with a high, triangular first dorsal fin of which the origin is over pectoral bases; pectoral fin broadly triangular, relatively long, interdorsal ridge present and upper caudal lobe stout; long and clearly round snout (Branstetter 1984; Barone *et al.* 2022). It is viviparous with 5-12 embryos per litter, and following a gestation period of 8 to 12 months, the size of the new-borns ranges from 50 to 60 cm TL (Golani *et al*. 2006). In Tunisian waters, gestation was estimated as 12 months, and the pupping season occurred in spring and early summer, with parturition in July (Saidi *et al*. 2005). The huge female sandbar shark, measuring 3 m in total length and weighing 70 kg, was captured

from northern Tunisia and this was probably the largest and heaviest sandbar shark recorded to date, on a worldwide scale (Soufi-Kechaou *et al.* 2018).

In the Mediterranean Sea, three nursery areas of *C. plumbeus* have been confirmed: Boncuk Cove (Gökova Bay) and Yumurtalık Bight (Gulf of Iskenderun) in Türkiye (Başusta *et al.* 2021) and the Gulf of Gabès in southern Tunisia (Bradai *et al.* 2005). Additionally, a recent paper (Lipej *et al*. 2008) reported juvenile sandbar shark in the waters off Piran, Slovenia, and this record might be considered a new nursery area for this species in the northern Adriatic Sea. In addition, in Boncuk Cove, Gökova Bay (Aegean Sea), pregnant females have been observed during May and July (Filiz 2019).

Globally, it is assumed that the sandbar shark has undergone a population decrease of 50-79% and it is assessed as Endangered (EN) in IUCN Red List (Rigby *et al*. 2021). All of these declines are attributed to exploitation for the use of its valuable meat, fins and liver oil. Moreover, sandbar sharks have also declined significantly in the Mediterranean Sea (Rigby *et al.* 2021).

It is no surprise that sandbar sharks (and probably other predators) occur around the fish farms along the eastern Mediterranean coast due to the aggregations of wild fish. Sandbar sharks have repeatedly been detected at fish farms owing to the steady source of food (Kabasakal and Gedikoğlu 2015; Barash *et al*. 2018). Moreover, although fish farms did not appear to disrupt seasonal movement patterns (e.g., for reproduction), individuals have repeatedly returned to the same site (Barash *et al.* 2018). In the present paper, the authors aim to contribute to better understanding of the relationships between sandbar sharks and fish farms in the Mediterranean Sea.

On 15 October 2021, ten individuals of *C. plumbeus* (Figure 1) were recorded by an underwater camera (GoPro Hero 7) around a fish farm sea-cage, which is used for the aquaculture of European sea bass (*Dicentrarchus labrax*) and gilthead seabream (*Sparus aurata*) off Arsuz coast, Iskenderun Bay (36.5911°N, 36.1233°E) at a depth of 50 m. Interviews with one of the divers, working for the fish farm were performed to collect detailed information. The water temperature was determined by the 'Suntoo d5' scuba dive computer.

The small groups of sandbar sharks (*C. plumbeus*) including 10 to 20 specimens were observed to aggregate around the cage farms, when the seawater temperature reaches >24°C and continued to swim around the cages. In this study, during the cleaning of the bag, attached to the bottom part of the cage to collect the dead reared fish, sandbar sharks were observed to approach the diver and sporadically attempted to attack the cage, as well. Therefore, a protecting net has been placed around the cages. Sharks are opportunistic feeders and may come close to sea-cages to prey upon the dead fish, which may also trigger the present aggregations

around the examined sea-cages. Fortunately, no harm to divers was observed (C. Kurt, pers. comm.).

Figure 1. Sandbar sharks, *Carcharhinus plumbeus* swimming around the sea-cages (October 2021) off Arsuz coast (Iskenderun Bay, northeastern Mediterranean Sea). (a) Anterior view, (b) Whole body from lateral side (photographed by C. Kurt)

Ergüden *et al.* (2020), however, reported from Mersin that several sandbar sharks attacked the divers, while they were cleaning the dead farmed fish in the cages on 26 August 2009. These incidents were apparently due to an excessive amount of wounded and/or dead farmed fish. Fortunately, attacks resulted in deep lacerations only on the dive equipment and non-severe injuries, and no fatalities occurred. Similar incidents were also reported from Güllük Bay (southeastern Aegean Sea), where large blue sharks, *Prionace glauca*, were observed swim around the sea-cages (Kabasakal and Gedikoğlu 2015). Furthermore, the growing tuna farm industry offers a new possibility for encounters between humans and large sharks, such as the great white shark, *Carcharodon carcharias*, off Turkish coasts. In at least one incident, which occurred during the summer of 2009 off the Kaş Peninsula (southwestern Türkiye), a diver, who entered a towing cage for a routine check of the condition of tunas and net, observed a great white shark which was attempting to tear the net (Kabasakal 2014).

Moreover, Barash *et al*. (2018) observed many injured sandbar sharks around the sea-cages of fish farms and attributed their existence to the easy finding of food. The authors also emphasized that if feeding at the fish farms has only the benefit of obtaining easy food, then one would expect to find sharks with higher

competitive abilities (large body size, physically intact). However, sporadically (about one in twenty specimens) injured sharks were observed in their study. Thus, this phenomenon is probably only an opportunistic feeding behaviour on wild fish communities around the sea-cages that act as mega FADs (Fish Aggregation Devices).

Large predatory sharks, including *C. plumbeus* have become particularly declining in the Mediterranean (Ferretti *et al*. 2008). Although, the species was known as common in the Levant Basin until the 1980s (Rigby *et al*. 2021), this endangered species could be using fish farms as the last sanctuary. It needs further studies on the reasons for the appearance of sandbar sharks at sea-cages to better understand many unknown behaviours of sharks regarding anthropogenic-related activities.

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İskenderun Körfezi'nde (Türkiye, Doğu Akdeniz) balık çiftlikleri civarında kum köpekbalığı *Carcharhinus plumbeus* (Carchardinidae) üzerine son gözlemler

Öz

15 Ekim 2021'de, Akdeniz'in İskenderun Körfezi'nde Arsuz sahili açıklarında bir balık çiftliğinin altında, kum köpekbalığı *Carcharhinus plumbeus*'un on kadar örneği gözlemlendi. Kum köpekbalıklarının 10-20 bireylik gruplar halinde deniz suyu sıcaklığı >24°C'ye ulaştığında balık çiftliklerinin etrafında toplandıkları ve kafeslerin etrafında yüzdükleri bildirilmiştir. Yetiştirilen ölü balıkları toplamak için kafesin alt kısmına takılan torbanın temizlenmesi sırasında, kum köpekbalıklarının dalgıçlara yaklaştığı ve ara sıra kafese saldırmaya çalıştığı gözlemlendi.

Anahtar kelimeler: Kum köpekbalığı, beslenme davranışı, saldırı, Levant baseni

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