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INTENTIONAL STRANDING OF A BLUE SHARK, *PRIONACE GLAUCA* (CARCHARHINIFORMES: CARCHARHINIDAE), IN PURSUIT OF PREY

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ABSTRACT

A short video recorded by a resident on 22 October 2020, on the Tisan-Yeşilovacık coast (northeastern Mediterranean), revealed the intentional stranding of a large specimen of *Prionace glauca* in order to pursue prey. Intentional stranding is a hunting strategy that differs from the blue shark's usual feeding behaviour; however, the reported event was nothing more than a lucky coincidence that shed a different light on the hunting behaviour of *P. glauca*. Moreover, the present incident is crucial as it shows that large shark species living in open waters can enter coastal waters for feeding purposes, increasing the likelihood of dangerous encounters with humans.

Key words: *Prionace glauca*, blue shark, stranding, hunting, coastal waters, eastern Levant

INCAGLIO INTENZIONALE DI UNA VERDESCA, *PRIONACE GLAUCA* (CARCHARHINIFORMES: CARCHARHINIDAE), ALL'INSEGUIMENTO DELLA PREDA

SINTESI

Un breve video registrato da un residente il 22 ottobre 2020, lungo la costa di Tisan-Yeşilovacık (Mediterraneo nord-orientale), ha rivelato l'incaglio intenzionale di un grosso esemplare di *Prionace glauca*, per inseguire una preda. L'arenamento intenzionale è una strategia di caccia che differisce dall'usuale comportamento alimentare della verdesca. Tuttavia, l'evento riportato non è stato altro che una fortunata coincidenza che ha gettato una luce diversa sul comportamento di caccia di *P. glauca*. Il presente incidente è inoltre cruciale in quanto dimostra che le grandi specie di squali che vivono in acque aperte possono entrare nelle acque costiere per nutrirsi, aumentando la probabilità di incontri pericolosi con l'uomo.

Parole chiave: *Prionace glauca*, verdesca, incaglio, caccia, acque costiere, Levante orientale

INTRODUCTION

The blue shark, *Prionace glauca* (Linnaeus, 1758), is an oceanic and circumglobal shark inhabiting temperate and tropical waters (Ebert & Stehmann, 2013). It is probably the widest-ranging chondrichthyan and nomad of the oceans, occurring from surface to at least 350 m in depth (Ebert & Stehmann, 2013). *P. glauca* is one of the well-documented pelagic sharks of the Mediterranean Sea (Serena *et al.*, 2020). Historically, the Mediterranean distribution of the blue shark extended into the Sea of Marmara, at least during the first quarter of the 20th century (Ninni, 1923), where it is now considered to be extinct (Kabasakal, 2020).

Small fishes and cephalopods, especially squids, associated with pelagic and inshore habitats, compose the primary prey of *P. glauca* (Tricas, 1979; Ebert & Stehmann, 2013). Although *P. glauca* is mainly an oceanic shark (Ebert & Stehmann, 2013), its coastal occurrences in very shallow waters have also been documented (Kabasakal, 2010); however, intentional stranding of the blue shark has not been observed previously. In the present article, the authors report

on an incident of intentional stranding of a large *P. glauca* specimen in pursuit of prey. Intentional stranding is a conspicuous hunting strategy, which is mostly observed in killer whales, *Orcinus orca*, when hunting for elephant seal pups, in pursuit of prey, the hunter swims directly to the surf zone and intentionally strands itself (Guinet & Bouvier, 1995).

MATERIAL AND METHODS

On 22 October 2020, a short (22 second) video of the present incident of intentional stranding of blue shark was recorded on the Tisan-Yeşilovacık coast (northeastern Mediterranean; Fig. 1) by a resident, Mr. Mustafa Çınar. The footage was emailed to the second author, who forwarded it to the first author to confirm species identification and analyses of the feeding behaviour. Species identification is based on the field marks provided by Ebert and Stehmann (2013). Feeding responses of the present blue shark were based on the feeding behaviour of *P. glauca* described by Tricas (1979). The footage has been archived by the authors and is available for further inspection on request.



Fig. 1: Map depicting the approximate location (*) of the blue shark's intentional stranding on the Tisan-Yeşilovacık coast, northeastern Mediterranean Sea.

Sl. 1: Zemljevid obravnavanega območja s približno lokaliteto (*), kjer je namerno nasedel sinji morski pes ob obali Tisan-Yeşilovacık v severovzhodnem Sredozemskem morju.

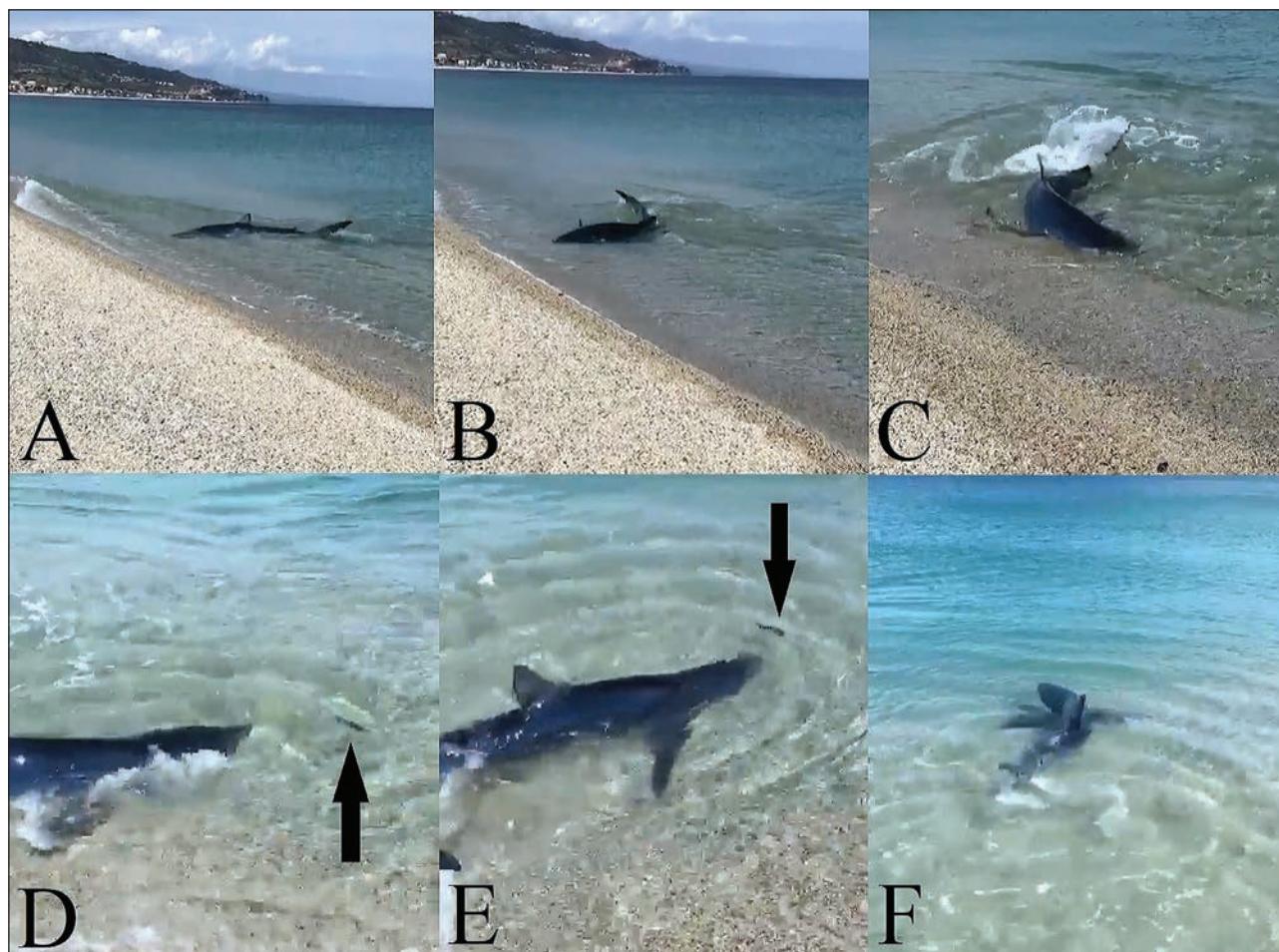


Fig. 2: Sequentially captured images of intentional stranding of a *P. glauca* during hunting: (a) charging of the blue shark; (b) bending tail and body just before turning; (c) turning; (d, e) head swaying; and (f) turning and moving away from the swash zone (Video footage courtesy of Mr. Mustafa Çınar).

Sl. 2: Zaporedni posnetki namernega nasedanja sinjega morskega psa *P. glauca* med lovom: (a) priprava; (b) zvijanje repa in telesa tik pred obratom; (c) obrat; (d, e) zibanje glave; in (f) obrat in umik iz obrežnega pasu (avtor posnetka: Mr. Mustafa Çınar).

RESULTS AND DISCUSSION

Dorsal coloration of the present specimen is dark blue, turning brighter on sides (Fig. 2); body slender (Fig. 2a, e, f) with long, pointed pectoral fins (Fig. 2e, f); the first dorsal fin is almost on the mid-body, but slightly closer to the pectoral-fin bases than the pelvic fins (Fig. 2a, e); the second dorsal fin is remarkably smaller than the first one (Fig. 2a); the caudal fin is narrow-lobed (Fig. 2a). The observed characters coincided with the field marks of *P. glauca*, presented by Ebert and Stehmann (2013). The total length of the shark was estimated to be 200 cm.

During the first seconds of the video, the blue shark was observed accelerating in a straight line (charging) into the swash zone (Fig. 2a, b), then turning in an alert state, and subsequently starting a series

of slow to fast lateral head swaying movements (Fig. 2c). The head swaying lasted nearly 11 seconds and was performed in an intentionally stranded status in the swash zone (Fig. 2b, c, d, e). During that time a fish, probably the prey, was seen moving around the blue shark's head (Fig. 2d, e). The shark made several unsuccessful attempts at grabbing it, then turned to the seaboard and moved away (Fig. 2f). The total duration of the observed intentional stranding of the blue shark was 17 seconds.

Killer whales, *Orcinus orca* (Linnaeus, 1758), are known for employing intentional stranding techniques when hunting sea lions and seals (Guinet & Bouvier, 1995; Vila *et al.*, 2008). Intentional stranding observed in *O. orca* is a very specialised hunting strategy. Juvenile killer whales practice it for a remarkably long time, learning through apprenticeship (Guinet

& Bouvier, 1995). Previous studies have shown that beaching play is an essential step in a successful intentional stranding of the killer whale, allowing the capture of prey (Guinet & Bouvier, 1995). Since no beaching play was observed in the present incident, the intentional stranding of the blue shark likely resulted from the predator's charging in the direction of the shoreline in too shallow coastal waters.

In an extensive survey on the feeding behaviour of *P. glauca*, near Santa Catalina Island, California (Tricas, 1979), underwater observation of blue shark during hunting revealed four feeding responses, namely, slow head swaying, turning, charging, and tail standing. In the present incident we observed three of the four feeding movements, all except the tail standing, which in the mentioned survey manifested with the shark first circling the lower portion of a school of prey, then moving up to the prey and assuming a near-vertical attitude, using broad tail sweeps to maintain position (Tricas, 1979). Since the blue shark in our case intentionally stranded, the tail standing was not possible; however, a quick sequence of charging, turning, head swaying, and turning again before the blue shark left the swash zone, was observed (Fig. 2).

Although *P. glauca* is an oceanic shark, frequently in pursuit of pelagic prey (Tricas, 1979; Ebert & Stehmann, 2013), the present incident suggests that it may occasionally use the intentional stranding technique to feed on coastal prey. Feeding was also reported as a possible reason for the unusual presence of *P. glauca* recruits in Galician coastal waters (Bañón *et al.*, 2016). The presence of coastal organisms has been observed in stomach contents of the blue shark. Tricas (1979) reported the presence of fishes associated with coastal habitats, such as the jack mackerel (*Trachurus symmetricus*), the pipefish (*Syngnathus californiensis*), and the blacksmith (*Chromis punctipinnis*), in the stomach contents of a *P. glauca* sampled in Californian waters. Kabasakal (2010) observed the remains of goatfish (*Mullus* sp.) and cuttlefish (*Sepia* sp.) in the stomach content of

a juvenile blue shark (98 cm TL) incidentally caught in the shallow waters of Edremit Bay (northeastern Aegean Sea).

The present incident of intentional stranding was a display of hunting strategy differing from the blue shark's usual feeding behaviour (Tricas, 1979). It was, generally speaking, nothing more than a lucky coincidence, which nevertheless provided a different perspective to the hunting behaviour of *P. glauca*. Although the blue shark is not very aggressive, it is not very timid either and has been known to harass spearfishing divers (Ebert & Stehmann, 2013). It is recognised that, besides *P. glauca*, several other large shark species, such as the shortfin mako shark (*Isurus oxyrinchus*) and the sandbar shark (*Carcharhinus plumbeus*), can also be seen in the coastal waters of the study area. Due to intensive fishing and aquaculture activities in the region the possibility of human encounter with large predatory sharks may be increasing. In a recent encounter of this kind with sandbar sharks, aquaculture divers have been involved in a provoked attack (Ergüden *et al.*, 2020). The present incident is important as it shows that large shark species living in open waters can enter coastal waters for feeding purposes, and this increases the likelihood of dangerous encounters with humans.

Although *P. glauca* is the most common shark in the eastern Mediterranean (Bariche, 2012; Damalas & Megalofonou, 2012), it is considered critically endangered in the Mediterranean Sea due to bycatching in pelagic fisheries (Otero *et al.*, 2019). Therefore, monitoring the existence and seasonality of large shark species, such as *P. glauca*, occurring in the region, especially near aquaculture cages, is of great importance in terms of both the survival of shark species and the safety of people.

ACKNOWLEDGMENTS

The authors thank to Mr. Mustafa Çınar for providing the footage of an intentionally stranded blue shark.

NAMERNO NASEDANJE SINJEGA MORSKEGA PSA, *PRIONACE GLAUCA* (CARCHARHINIFORMES: CARCHARHINIDAE), MED ZASLEDOVANJEM PLENA

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POVZETEK

Domačin z obale Tisan-Yeşilovacık (severovzhodno Sredozemsko morje) je 22. oktobra 2020 posnel krajši videoposnetek o namernehm nasedanju velikega primerka sinjega morskega psa, *Prionace glauca*, ki je zasleoval plen. Namerno nasedanje je plenilska strategija, drugačna od običajnega plenjenja. Slučajna in srečna okoliščina, v kateri je nastal posnetek, je obelodanila nenavadno vedenje. Poleg tega je ta primer pomemben, ker je pokazal da lahko odprtovodni morski psi lahko zaidejo v obalne vode zaradi prehranjevanja, s tem pa do večje možnosti nevarnih srečanj s človekom.

Ključne besede: *Prionace glauca*, sinji morski pes, nasedanje, lov, obalne vode, vzhodni Levant

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