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How accurately are we describing the longline bycatch? The case of the ‘rare’ shark *Alopias superciliosus* in eastern Mediterranean

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Abstract

The bigeye thresher shark, *Alopias superciliosus*, is a highly cosmopolitan species found in tropical and temperate seas worldwide. Its presence in the Mediterranean has been poorly documented while in the eastern Mediterranean, it has been confined on individual-based records and considered as scarce. Hereby, we provide evidences from two longline fishing trips of at least eight by-catch specimens. These represent the first confirmed presence of *A. superciliosus* in the waters of Cyprus and the first documentation of such a large occurrence of the species in the eastern Mediterranean. It is evidenced that the participation of scientific observers on-board is imperative in order to avoid misreporting and misidentification of by-catch species, and enable a correct and representative assessment of the marine resources. Finally, the incorporation of underwater cameras during the scientific programmes is encouraged since it can provide insights on the species identity and post-release mortality of the discarded specimens.

Keywords: *Alopias*, fishery, longline, mediterranean, monitoring, by-catch

1. Introduction

The bigeye thresher shark, *Alopias superciliosus* Lowe, 1841 is a highly cosmopolitan, migratory epipelagic and mesopelagic species, occurring circumglobally in tropical and temperate seas [1]. The first Mediterranean record of *A. superciliosus* was initially reported in the beginnings of 1980s, based on four specimens captured in the Sicilian Channel (Italy) [2]. However, Corsini-Foka and Sioulas [3] published the storage of two deposited specimens in an exhibition station in Greece which have been captured in the Dodecanese waters of Aegean Sea (eastern Mediterranean) since 1952.

The Mediterranean *A. superciliosus* population is listed as “Endangered” by the IUCN Red List of Threatened Species due to its susceptibility to fisheries exploitation (target and bycatch) and the life history characteristics and low productivity of the species [4]. This led ICCAT to prohibit the retaining on board, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of the *A. superciliosus* (EU, 2016/72).

Despite the fact that is usually a common by-catch / discarded species in artisanal net and longline fishery [5], its presence has been poorly documented in the Mediterranean Sea [6]. Until recently, its occurrence was known only from records in the western basin, albeit scarce or rare [7]. During the last decades, there has been a substantial increase of *A. superciliosus* records from the eastern Mediterranean, but these have been rather sporadic and individual-based, while reflecting a very small catch compared to fishing effort [6, 8-11].

The inability of recording accurately the extent of discards and by-catch of vulnerable/endangered species, such as of *A. superciliosus*, can lead to biased scientific recommendations and fisheries management [12]. In the present article, the authors provide evidences that the abundance of the shark in the eastern Mediterranean might be underestimated and highlight the importance of observer programmes from capable researchers. Several *A. superciliosus* specimens are reported from longline fishing samplings along the territorial waters of Cyprus in the eastern Mediterranean for the first time while anecdotal information indicate that the species has been long present in the area.

2. Methodology

As part of a National Programme and in the context of the European Data Collection Framework (DCF) of European Union, scientific observers attended two longline fishing trips on 28st of April 2015 and 24th of September 2015 which lasted for two days (Day 1-2) and four days (Day 3-6) respectively. Both trips were targeting *Xiphus gladius* using a pelagic longline set horizontally, made up of around 500 - 1000 single-baited hooks (size 7 straight shank hook). The chub mackerel (*Scomber japonicus*) and the European flying squid

(*Todarodes sagittatus*) were used as baits. The fishing area was located 10 to 50 nautical miles southeast of the island (Figure 1). The setting of longlines was taking place every day, before the sundown for about six hours (i.e. from 18.00 to 00.00 hour), while hauling was starting early after sunrise for around seven hours (i.e. from 06.00 to 13:00 hour). Since a large portion of the by-catch/discard specimens are released before hauled up to vessel, a GoPro camera was placed underwater to record and provide evidences for the species caught, where possible.

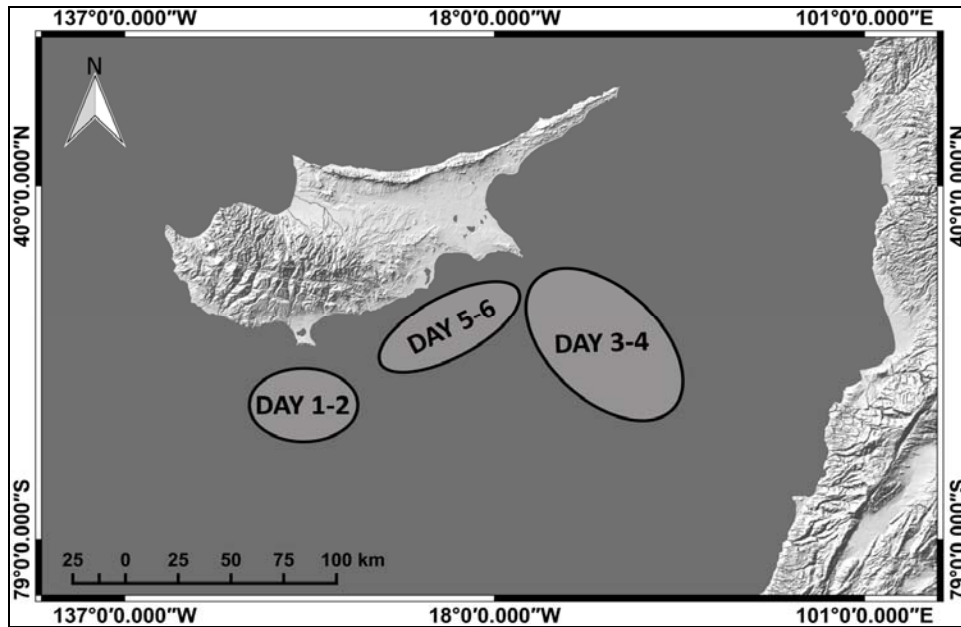


Fig 1: Map showing the fishing area south of Cyprus during the first trip (Days 1 – 2) and the second trip (Days 3 – 6).

3. Results

A total of ten *A. superciliosus* were by-caught during the trips, of which eight have been video-recorded or captured with a camera; half of them underwater (Figure 2). Two of the specimens were caught and photographed during the first trip (Day 1-2) and eight specimens - of which six have been recorded with a camera - were caught during the first three days of the second trip (Day 3-5). The underwater camera has

shown that all specimens recorded underwater were heavily injured (n=3) or dead (n=3). In addition, during the first trip, a dead specimen was hauled up to the vessel for photographs before being discarded back into the ocean (Figure 2G). The approximate Fork Length (FL) of that individual was 160 cm. Since all the other specimens were released before hauled up to the vessel, details on their meristic and morphometric characteristics was not obtained.

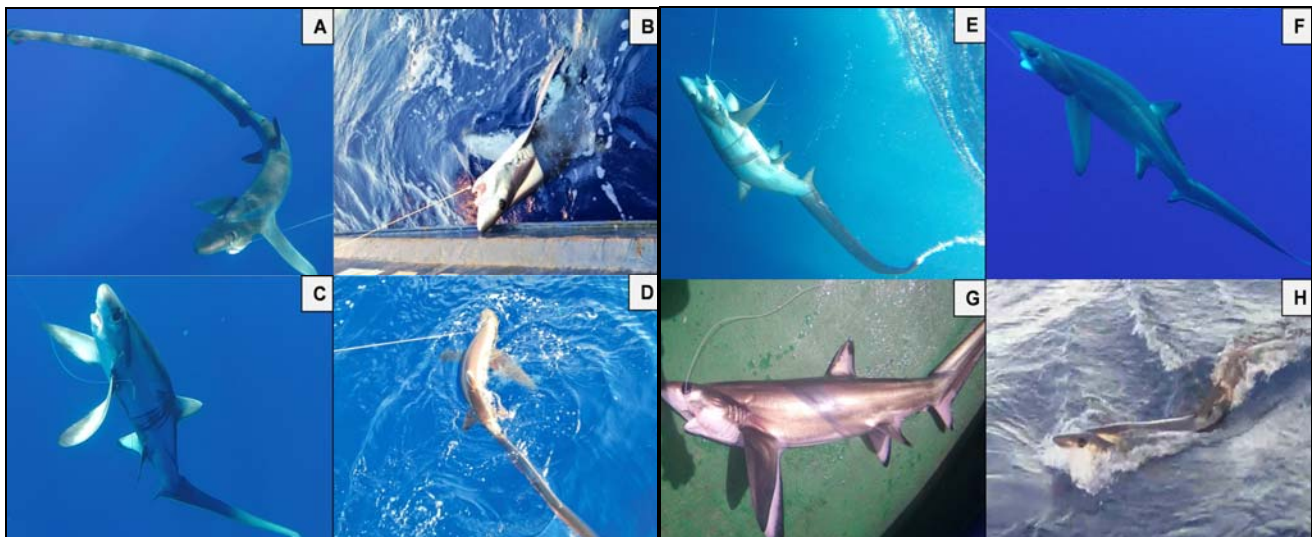


Fig 2: Pictures of the *A. superciliosus* captured during the two longline trips. Specimens A – F were captured during the second trip and specimens G-H were captured during the first trip.

4. Discussion

These records represent the first confirmed presence of *A. superciliosus* in the waters of Cyprus, and the first such a large occurrence of the species in the eastern Mediterranean basin from such a low fishing effort. However, they do not constitute the only records of *A. superciliosus* from the scientists on-board during the implementation of the particular National Programme as one individual was captured in two one-day duration fishing trips on August and December of 2015, and two individuals were captured in each of other two one-day duration fishing trips on February 2016, a total of six more specimens all released as discards. All of these trips were targeting *X. gladius* but no evidence (photograph) has been acquired for those records.

Nevertheless, the above information suggest that *A. superciliosus* might not be so rare and scarce in the region as it has been previously considered [3, 13, 14], but rather a widely distributed species in the Mediterranean as assessed by De Maddalena [15]. Based on anecdotal information by fishermen, *A. superciliosus* is a common by-catch species in longline fishing of Cyprus for many years now. It is important to note, that in an effort to reconstruct the fishery catch data of Cyprus for the period of 1950 to 2010, thresher shark (*Alopias spp.*) was considered as one of the major discarded taxa in longline fishery but only *A. vulpinus* was mentioned in the Cyprus fish lists created [16, 17].

It is noteworthy that no *A. vulpinus* was recorded during the implementation of the particular National Programme. The clear morphological characteristics of *A. superciliosus* such as the deep groove on sides of the head and the large eyes that can extend up to the dorsal surface of the head, clearly distinguish it from its congeneric *A. vulpinus*, and therefore the likelihood of misidentification as suggested by other authors is low [3, 10]. On the other hand, based on personal observations it is possible that even if fishermen know the differences between the two species, the fact that they share the same common name can lead to subsequent misreporting in the logbooks. The same applies in many other countries and for various other species that share the same common name with their congeneric [13]. Nevertheless, misreporting can be even more significant in other by-catch species which are more difficult to identify such as the whaler sharks (*Carcharinus spp.*) [18].

It is evident that the presence of scientific observers on commercial vessels offers considerable advantages compared to other important advanced control technologies (e.g. video surveillance, electronic reporting system (ERS), etc.) since it can help to avoid such misidentifications / misreporting, ensure that all catches are reported, and support the collection of valid and representative biological data while concurrently building connections and common grounds between the fishermen and the research community. Moreover, observer data offer other considerable and manifold services including monitoring of the catch and mortality of endangered, threatened and protected species, information on the performance of bycatch management measures, and a subset of inputs for ecological risk assessments, productivity-susceptibility analyses and multispecies and ecosystem models [19]. Thus, ecological data obtained from inexpensive observer programmes underpin ecosystem-based fisheries management while supporting an accurate and reliable assessment of the state of marine biology resources and the impact of fishing activities on them.

The importance of observer programmes appears to be

realised as recent ICCAT Recommendation [13-04] requires national scientific observers' deployment to at least 5% of all pelagic longline vessels targeting Mediterranean swordfish from each Contracting Party and Cooperating non-Contracting Party, Entity, or Fishing Entity (CPCs). However, it is important for the Europe to ensure that the scientific observers have the necessary expertise to correctly identify the taxa of the species caught. For example, the tender for the collection of pelagic fishery data of the Cyprus National Programme of DCF does not set any criteria from the scientific observer(s) responsible for the samplings at sea and that allows non-scientists or people with inadequate experience to act as scientific observers on-board. The application of ICCAT Rec. [13-04] requires an assessment and report of the level of discards and to this end it is imperative that the scientific capacity of the national observers is ensured either through a certificate or through a proved experience.

5. Conclusion

It is questionable whether *A. superciliosus* expansion in the eastern Mediterranean is a recent phenomenon or if it is the lack of a robust data collection monitoring scheme that led to the underestimation of this species status in the past years. It is a fact however, that if eligible scientific researchers did not participate in this monitoring programme, the abundance of *A. superciliosus* in the eastern Mediterranean would continue to be underestimated. Therefore, it is of imperative value that the monitoring of fishery catch, including discards, is improved by the regular use of eligible scientific observers who can form the fundamental basis and advice for correct fisheries management. Furthermore, given that many of the discard species are released while still in the water, the provision of photographic evidences is usually low and their species identification is difficult, if not impossible. To this end, the incorporation of underwater cameras in the fishing observation programmes could be evaluated as they can provide insights on the species identity and post-release mortality of the by-catch specimens.

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