

Kemunculan Angular Roughshark (*Oxynotus centrina* Linnaeus, 1758) di Teluk Finike dan Shortfin Mako (*Isurus oxyrinchus* Rafinesque, 1810) di Mediterania Bagian Barat, Turki

Occurrences of the Angular Roughshark (*Oxynotus centrina* Linnaeus, 1758) in the Gulf of Finike and Shortfin Mako (*Isurus oxyrinchus* Rafinesque, 1810) in the Western Mediterranean, Türkiye

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Abstract

The Mediterranean Sea experiences some of the highest levels of fishing pressure globally. Cartilaginous fish are the most impacted by this pressure, with their populations declining swiftly in the Mediterranean and across the world. There is limited data about sharks in the Mediterranean region. This research documented three Shortfin Mako sharks (*Isurus oxyrinchus* Rafinesque, 1810), in the Gulf of Antalya and the Angular Roughshark (*Oxynotus centrina* Linnaeus, 1758) was recorded for the first time in the Bay of Finike. These species are classified as Critically Endangered (CR) on the IUCN Red List, in the Mediterranean Sea.

Keywords: Fishing; Gulf; Shark; Turkey

1. Introduction

The Mediterranean Sea serves as a crucial environment for cartilaginous fish. 48 shark, 40 batoid and 2 chimaera species have been recorded in the Mediterranean Sea (Bradai et al. 2022). The numbers of all cartilaginous fish species in this habitat are rapidly decreasing. Chondrichthyans have a slow growth rate, reach maturity later in life, and typically produce a limited number of offspring. These characteristics make them particularly susceptible to overfishing and other human-based disturbance (Bradai et al. 2018). This loss of top predators on the food pyramid could have serious consequences for the entire marine ecosystem and greatly impact the food chain in this region.

Most sharks in the Mediterranean are captured as bycatch, with only a small number of these species can categorized as target catch (Erguden et al., 2020). Evidences suggests that the population and diversity of cartilaginous fish, particularly sharks, in the whole Mediterranean are declining (Reference needed). This decrease is attributed to the high demand for their fins, meat, and cartilage, along with the pressures from intensive fishing operations. According to Bradai et al. (2022), despite the increase in fishing power in the Mediterranean, the number of cartilaginous fish species caught has decreased. In 2009, the catch of cartilaginous fish species

amounted to 20,000 tons, but by 2020, this amount had dropped to 12,000 tons. The countries that hunt the most sharks in the Mediterranean are Libya, Tunisia, Italy, and Egypt, respectively.

While fishing activities seem to be the primary cause of mortality among cartilaginous fish, they are not the only effect on their populations. Fishing activities can disrupt habitats by affecting both biotic communities and the substrates they rely on. Additionally, activities such as shipping, underwater exploration, construction, mining, electrical installations, and offshore cage aquaculture also have significant effects on these environments. Moreover, high levels of ambient sound, light, electromagnetic fields, and chemical pollution can interfere with the sensory systems of fish (Bradai et al. 2018).

Cartilaginous species, including sharks, rays and chimaeras, are by far the most endangered group of marine fish in the Mediterranean waters (WWF 2019). Of the 73 species evaluated in the Mediterranean, the Red List status for Chondrichthyans reveals that 39 of them, which accounts for 53% of the total, are classified as critically endangered, endangered, or vulnerable (Bradai et al. 2018). More than 97% of shark populations have been reported to have diminished in the last two centuries. These species are currently highly threatened and many species are data deficient. Although sharks face many threats, the greatest pressure comes from fishing (Bradai et al. 2022). The angular rough shark (*Oxynotus centrina*) and three species of angel sharks (*Squatina spp.*) are also Critically Endangered (WWF 2019). One of the most endangered species in the Mediterranean is *Mobula mobular*. Females of this

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fish can grow up to five meters long and give birth to only one offspring per breeding cycle. This large size and low fecundity make stingrays particularly vulnerable to capture and tangle in a variety of net fisheries, including illegal drift nets. The shortfin mako (*Isurus oxyrinchus*), porbeagle (*Lamna nasus*) and blue shark (*Prionace glauca*), which are targeted for their meat and fins, are three other Critically Endangered species in the Mediterranean (IUCN, 2024).

The WWF report from 2019 highlights a significant lack of data concerning sharks. A majority of these fish go unrecorded, and the information provided by fishermen can often be unreliable. The aim of this study is to provide the data on the capture of two very rare species in the Mediterranean from the Gulfs of Antalya and Finike.

2. Materials and Methods

Shrimp fishing in the deep waters Bay of Finike is conducted through bottom trawling. A very rare female shark (*Oxynotus centrina* Linnaeus, 1758) was caught in the Mediterranean Sea during trawling between coordinates 36°15' 51.12" N, 30°10' 0.6" E and 36° 10' 44.5" N, 30° 1' 49.8" E on November 25, 2021 in the Bay of Finike and at a depth of approximately 400-500 m (Fig. 1). The length and weight of the caught female fish specimen were measured.

Swordfish fishing in the Gulf of Antalya is done with pelagic longlines. In personal interviews with fishermen, it is reported that better yields are obtained when fishing during the winter season. On January 15, 2021, during longline swordfish fishing, a mako shark was caught and taken dead from the longline (Longline Coordinates between: 36° 44' 44.28" N, 30° 35' 51.13"E and 36° 42' 53.85" N, 30° 43' 31.07" E). On November 7, 2023, 2 mako were caught in a 36 mm mesh-sized trammel net at the coordinates 36° 52' 2.07" N, 30° 39' 13.05" E of Antalya Konyaaltı beach (Fig. 1). The total length and weight of these caught fish were measured.

3. Results and Discussion

3.1. Results

3.1.1. Angular Roughshark (*Oxynotus centrina* Linnaeus, 1758)

A female angular roughshark was caught during a deep-water shrimp trawl in the Bay of Finike. The length and weight of the caught female fish were measured (Fig 2). Total length and weight of the fish are 56 cm and 2,830 kg, respectively. *O. centrina*, individual was released to its natural environment alive after the length and weight measurements were made.

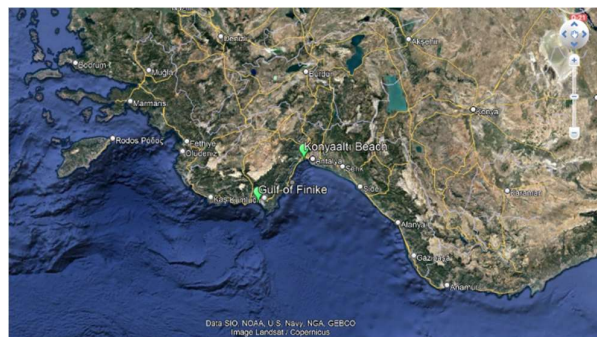


Figure 1. Finike Bay where *O. centrina* was caught and Konyaaltı Beach where *I. oxyrinchus* was caught.

3.1.2. Shortfin Mako (*Isurus oxyrinchus Rafinesque, 1810*)

A shortfin mako shark, caught as bycatch while fishing for swordfish in the Gulf of Antalya, was retrieved dead from the

longline. The shark measured 116 cm in total length and had a weight of 12.2 kg. Additionally, two mako sharks measuring a combined length of 110 cm and weight around 15 kg were caught in a 36 mm mesh sized trammel net, which was set off the coast of Konyaaltı beach in Antalya (Fig. 3). These individuals were captured dead from the net.

3.2. Discussion

In this study, it is aimed to announce the data about these fishes, which is gradually decreasing in the Mediterranean, to the scientific community. Angular rough shark *Oxynotus centrina* (Linnaeus, 1758) is distributed along the Bay of Biscay and Mediterranean Sea to Senegal, north apparently as a stray to Cornwall, England; also possibly from Liberia to Nigeria, Gabon to Namibia, and South Africa. This fish is a sluggish shark found across continental shelves and upper slopes at depths ranging between 30 and 800 m (Kabasakal, 2010). Angular rough shark is very rarely caught as bycatch in trawl nets (Bayhan et al., 2018; Erguden et al., 2022). Since *O. centrina* has no economic value, the fish is often thrown back into the sea. *O. centrina* is a demersal species that can reach a maximum length of 150 cm (Yiğın et al., 2016). It is a very rare shark species caught off the coast of Turkey and is in the CR category on the IUCN's list (Finucci et al., 2021). Male and female angular roughsharks are reported to mature at about 50-70 cm. The total length of *O. centrina* caught in the Bay of Finike was measured as 56 cm. After its length and weight measurements were taken, this fish was released back into its natural habitat alive and is a female individual that has reached sexual maturity. Although, some studies have shown that females mature at a slightly larger size than males. It is an ovoviviparous shark species and gives about 6-7 youngs. Başusta et al., (2015) detected 11 developing yellow yolk oocytes, in an *O. centrina* female caught in Iskenderun Bay.



Figure 2. *Oxynotus centrina* individual caught in the Bay of Finike.

According to Kabasakal (2010), *O. centrina* has been caught in different parts of the Marmara Sea (Yassıada, Ekinlik, Bandırma, Balıkcı, Marmara Islands coast), Aegean Sea (Bozcaada coast, Saroz Bay) and Mediterranean Sea (Iskenderun Bay and Mersin Bay) (Erguden et al., 2013; Bayhan et al., 2018; Erguden et al., 2022) on the Turkish coasts. However, there aren't any records of this fish being caught from the Bay of Finike. This study gives the first record of *O. centrina* from the Bay of Finike.

Chondrichthyan (sharks and rays) are among the most threatened groups (Yagliglu et al., 2015). These species in the oceans currently, nearly a quarter of species are at elevated risk of extinction (Dulvy et al., 2014; Mackeracher et al., 2018). These species are slow growing, reaching sexual maturity late and have low fecundity. There is also overfishing pressure on these species. Some precautions are tried to be taken against these reductions of sharks and rays. Despite efforts to combat these declines, each year, tens of millions of sharks are caught and traded in international markets (Simpfendorfer & Dulvy, 2017; Mackeracher et al., 2018).

More than half of the species of sharks and rays living in the Mediterranean are under threat with almost a third of them

fished close to the level of extinction. One of these species is the Mako shark (*Isurus oxyrinchus* Rafinesque, 1810). This species is in the CR (Critical) category in the list of IUCN in the Mediterranean (Erguden et al., 2021).



Figure 3. Mako individuals caught in the Gulf of Antalya.

There are many fishermen who catch swordfish with longline in the Gulf of Antalya. In personal interviews with these fishermen, they reported that they usually catch swordfish in the autumn and winter seasons. It was reported that while fishing, blue sharks (*P. glauca*), purple stingrays (*Pteroplatytrygon violacea*), and mako sharks (*I. oxyrinchus*) were caught as bycatch, and these fish were released back into their natural habitat alive. However, the mako shark that was one of the subjects of this study was taken dead from the longline. Known as bonito/mackerel sharks by fishermen, makos can reach a maximum length of 500 cm (Fishbase 2024). Considering that these fish attain sexual maturity at lengths between 272 and 285 cm, the individual caught on the swordfish longline is relatively young. Likewise, the mako sharks that have been captured the shores of Konyaalti beach are also young individuals. The shortfin mako is a common, highly active species that inhabits pelagic, coastal, and epipelagic zones in tropical and warm temperate oceans; however, it is seldom encountered in waters with temperatures below 16°C. This shark is observable from the surface down to a depth of 152 meters. Recognized as the fastest shark globally, it is also among the most active fish species. That fish capable of jump out of the water multiple times its own length. It can show remarkable bursts of speed when it is hooked or chasing after its prey (FAO 2023). It is known that some young makos have been seen and caught during sport fishing by boats in the Gulf of Antalya. According these datas it can be considered that the Gulf of Antalya is one of the breeding areas of Mako sharks. Sharks are among the most vulnerable fish species in the Mediterranean and their species are decreasing. Limited data is available on these fish. This study reports on two shark species caught in the Antalya and Finike waters, categorized as Critically Endangered (CR) by the IUCN Red List.

Bibliography

Bayhan, Y.K., Erguden, D., and Cartes, J. 2018. Deep sea fisheries in Mersin Bay, Turkey, Eastern Mediterranean: Diversity and abundance of shrimps and benthic fish fauna. *Acta Zoologica Bulgarica*, 70(2), 259-268.

Başusta, N., Turan, C., and Başusta, A., 2015. New records of gravid female and adult male of the angular rough shark, *Oxynotus centrina* (Oxynotidae) from the northeastern Mediterranean. *J. Black Sea/Mediterranean Environment*, 21(1), 92-95.

Bradai, M.N., Said,, B., and Enajjar, S., 2018. Overview on Mediterranean Shark's Fisheries: Impact on the biodiversity. *Marine Ecology - Biotic and Abiotic Interactions*. Chapter 10. 211-230.

Bradai, M.N., Enajjar, S., and Said, B. 2022. Sharks' Status in the Mediterranean Sea Urgent Awareness is Needed. Chapter 5. Sharks - Past, Present and Future. P. 210 Edit. Mohamed Nejmeddine Bradai. <https://dx.doi.org/10.5772/intechopen.108162>

Dulvy, N.K., Fowler, S.L., Musick, J.A., Cavanagh, R.D., Kyne, P.M., Harrison, L.R., and White, W.T. 2014. Extinction risk and conservation of the world's sharks and rays. *eLife*, 3, e00590. <https://doi.org/10.7554/eLife.00590>

Erguden D., Gurlek, M., and Turan, C. 2013. A young *Isurus oxyrinchus* Rafinesque, 1810 (Chondrichthyes: Lamnidae) individual captured from Iskenderun Bay, Turkey. *Mediterranean Marine Science*, 14(2), 451-468.

Erguden, D. Ayas, D., and Kabasakal, H. 2021. Recent occurrences of shortfin mako shark, *Isurus oxyrinchus* Rafinesque, 1810 (Chondrichthyes: Lamnidae), from the North-Eastern Mediterranean Coast of Turkey. *Çanakkale Onsekiz Mart University Journal of Marine Sciences and Fisheries*, 4(1), 79-85.

Erguden, D., Kabasakal, H., Ayas, D. 2022. Fisheries bycatch and conservation priorities of young sharks in the Eastern Mediterranean. *Zoology in the Middle East*, 68 (2), 135-144. <https://doi.org/10.1080/09397140.2022.2051916>.

FAO. 2023. *Isurus oxyrinchus* Rafinesque,1809. Fisheries and Aquaculture Division [online]. Rome. [Cited Tuesday, June 6th 2023]. <https://www.fao.org/fishery/en/aqspecies/2011/en>

FishBase. <https://www.fishbase.se/summary/isurus-oxyrinchus.html> (Access date: 06.06.2023)

Finucci, B., Chartrain, E., De Bruyne, G., Derrick, D., Ducrocq, M., Williams, A.B. and VanderWright, W.J., 2021. *Oxynotus centrina*. The IUCN Red List of Threatened Species 2021: e.T63141A124462573. <https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T63141A124462573.en>. Accessed on 02 February 2022.

IUCN. 2024. Red List (<https://www.iucn.org/content/mediterranean-sea-most-dangerous-place-earth-sharks-and-rays> Access date: 03.09.2024)

Kabasakal, H. 2010. Historical and contemporary records of the Angular Rough Shark *Oxynotus centrina* (Chondrichthyes; Oxynotidae) in Turkish waters. *Mediterranean Marine Science*, 11(2), 361-368.

Mackeracher, T., Diedrich, A., and Simpfendorfer, C.A. 2019. Sharks, rays and marine protected areas: A critical evaluation of current perspectives. *Fish and Fisheries*, 20: 255–267.

Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. and Winker, H. 2019. *Isurus oxyrinchus*. The IUCN Red List of Threatened Species 2019: e.T39341A2903170. <https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T39341A2903170.en>.

- Simpfendorfer, C.A., and Dulvy, N.K. 2017. Bright spots of sustainable shark fishing. *Current Biology*, 27(3), R97–R98. <https://doi.org/10.1016/j.cub.2016.12.017>
- WWF. 2019. *Sharks in Crisis: A Call to Action for the Mediterranean*. p.40.
- Yaglioglu, D., Deniz, T., Gurlek M., Erguden, D., and Turan, C. 2015. Elasmobranches bycatch in a bottom trawl fishery in the Iskenderun Bay, Northeastern Mediterranean. *CBM, Chaiers de Biologie Marine*, 56(3), 237-243.
- Yığın, C.Ç., İşmen, A., and Önal, U. 2016. Occurrence of a rare shark, *Oxynotus centrina* (Chondrichthyes: Oxynotidae), from Saros Bay, North Aegean Sea, Turkey. *J. Black Sea/Mediterranean Environment*, 22(1): 103-109.