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Some Morphometric Measurements of the Critically Endangered Angular Roughshark *Oxynotus centrina* (Linnaeus, 1758) Caught by Trammel Nets in the Sea of Marmara

*Marmara Denizi'nde Fanyalı Uzatma Ağlarına Yakalanan Kritik Tehlike Altındaki Domuz Köpek Balığının *Oxynotus centrina* (Linnaeus, 1758) Bazı Morfometrik Özellikleri*

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Abstract

Angular roughshark (*Oxynotus centrina*) is a rare occurrence and one of the critically endangered species. In our study, some morphometric measurements of angular roughshark individual caught as bycatch with trammel nets was investigated in the Southern coasts of the Marmara Sea, Turkey. The weight of this species, which was caught in these nets, was weighed as 212 gr due to the degradation by parasites. The actual weight before degradation was estimated as 2623 gr from the length-weight relationship formulation. Some morphometric measurements of the species were performed and compared with previous studies. In fisheries, there is a need for all kinds of information about endangered species such as angular rough sharks, which are accidentally caught. Fishing techniques should be developed to prevent these species from being caught in fishing gears, and their survival should be ensured with appropriate protection measures.

Keywords: Angular Rough Shark, Trammel Nets, By-catch, Marmara Sea, Oxynotidae

Öz

Domuz köpek balığı, nadir bulunan ve kritik yok olma tehlikesi altında bir türdür. Çalışmamızda Marmara Denizi'nin güney kıyılarında fanyalı uzatma ağları ile tesadüfi olarak yakalanan domuz köpek balığı bireyinin bazı morfometrik ölçümleri araştırılmıştır. Ağlara yakalanan türe parazitik canlıların zarar vermesi nedeniyle ağırlığı 212 gr tartılmıştır. Bozulmadan önceki gerçek ağırlığının ise boy-ağırlık ilişkisi formülasyonuna göre 2623 gr olduğu tahmin edilmiştir. Türün morfometrik ölçümleri gerçekleştirilerek, önceki çalışmalar ile karşılaştırılmıştır. Balıkçılıkta domuz köpek balığı gibi tesadüfen yakalanan nesli tehlikede olan türler hakkında her türlü bilgiye ihtiyaç vardır. Bu türlerin av araçlarına yakalanmaması için avlanma teknikleri geliştirilmeli ve uygun koruma önlemleri ile yaşamaları sağlanmalıdır.

Anahtar kelimeler: Domuz Köpekbalığı, Fanyalı Uzatma Ağları, Hedefdışı Av, Marmara Denizi, Oxynotidae

I. INTRODUCTION

The angular rough shark, *Oxynotus centrina* (Linnaeus, 1758) (Chondrichthyes: Oxynotidae), is a rare occurrence species [1-3]. So, there is very limited information about this species [4]. The size of this species ranges from 50 to 70 cm TL, with a maximum size of 150 cm TL [3, 5, 6]. It is a sluggish shark that exists across continental shelves and upper slopes at depths ranging between 30 and 800 m [1, 7].

O. centrina can be found in the Eastern Atlantic from Norway to Portugal, as well as the Madeira and Canary Islands, Morocco, Mauritania, the Guinea region, Gabon, Angola, Namibia, and South Africa. Also, except for the coasts of the Black Sea, throughout the Mediterranean Sea [1-3, 6, 8]. *O. centrina* is currently considered as “vulnerable” all across the globe and “critically endangered” in the Mediterranean, listed in the IUCN Red List [9, 10]. Its population shows a constant decrease [9, 10].

Despite its scarcity, *O. centrina* can be caught as bycatch in a variety of fishing activities [3, 6, 8, 11, 12]. It is generally thrown out to the sea by fishermen because it is not commercially valuable. In addition to this it is known that its caught bycatch via purse seine nets, longline, bottom trawl and beam trawl in Turkey fisheries [13-21]. *O. centrina*'s large spiny dorsal fins and relatively large body size make it particularly vulnerable to be captured by nets [3, 6]. Trammel nets used to catch demersal fish are soaking time for nearly 10 days in the Sea of Marmara. The purpose of commercial fishermen keep these nets for a long time is to increase fishing efficiency [22]. But in this way, sharks can catch in the trammel nets.

The information caught is crucial to our understanding of deep-sea Chondrichthyans in the Mediterranean Sea, so every new piece of information about deep-sea sharks in the Sea of Marmara is vitally important. In this scientific research, one of the *O. centrina* was caught by trammel nets and recorded. Previous records of this *O. centrina* was in Turkish seas were open to debate once again.

II. MATERIAL and METHOD

In this study one of the critically endangered species, Angular roughshark caught as bycatch in trammel nets was investigated in the Southern coasts of the Marmara Sea, Turkey. This species caught as dead in 42 mm mesh size in the 5 days soaking time trails in Southern coasts of Marmara Sea on December 23, 2020 (Coordinates of sampling area: 40° 27' N - 27° 03' E) was a critically endangered species in the Mediterranean Sea (Figure 1). This species was

identified according to Compagno [1] and investigated. Morphometric measurements and weight were obtained and photographed (Figure 2). Due to the degradation of this species, its actual weight could not be measured accurately.

The length-weight relationship is a frequently used analytical tool in fisheries management and fisheries biology [23, 25]. This equation has been widely utilized to estimate weight from more readily quantifiable variables such as length [24, 25]. Thus, to get the needed weight (W) of this shark, the length-weight connection has been used in the formalization of $W=a.L^b$. W was computed using the a, b, and total length (L) values found in Güven et al., [26], which is the only research in the literature that establishes the length-weight relationship for this species.

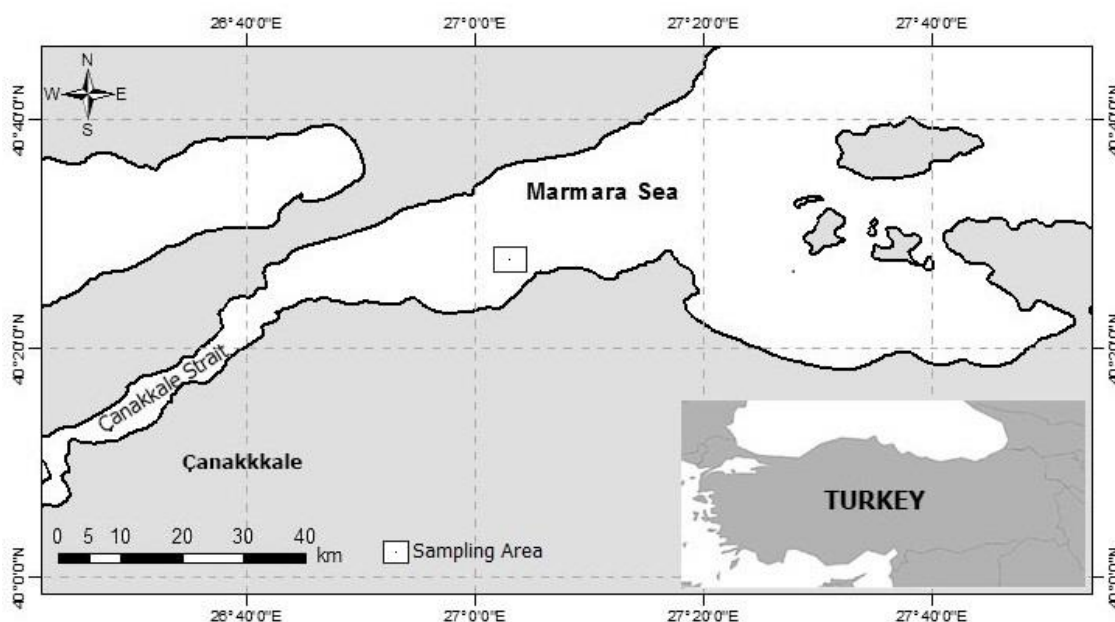


Figure 1. Sampling area of the *O. centrina* in the Marmara Sea.



Figure 2. *O. centrina* caught from the Marmara Sea.

III. RESULTS and DISCUSSION

The measured total length of *O. centrina* caught during the trials was 558 mm and its weight was 212 gr. This individual was obtained in nets haul from the sea in 5 days. The actual time of capture was unknown and some parasites (isopods) were detected in this individual. The lack of excess tissue loss in the individual's skin supported that the individual had recently been caught and the weight loss was due to parasites rather than visible rot in the postmortem meat.

The required weight of this individual by the values $a=0.0151$ and $b=3$ in Güven et al., [26] was calculated as 2623 gr. In some of the previous studies, Kabasakal [20] mentions that an individual caught by commercial

fishermen at 50 m depths in the northeast of the Marmara Sea has a total length of 45 cm and a weight of 1200 gr. In the North-East Aegean Sea, Öztekin et al., [30] also mentioned that an individual they caught with a long line (in the western coast of the Gallipoli peninsula) had a total length of 41 cm and a weight of 810 gr. Kousteni and Megalofonou [4] measured two individuals of *O. centrina* whose length 533 mm and 565 mm, weight 1649 gr and 1703 gr respectively. But it should not be forgotten that the weight of the fish caught is related to the condition factor. The morphometric measurements (mm) of this species and the comparative results measured in previous studies conducted are shown in table 1.

Table 1. Morphometric measurements of *O. centrina* caught in the Marmara Sea and other areas (ca=calculated).

Morphometric characteristics (mm, g)	This study	[19]	[27]	[11]	[4]		
	South Marmara Sea	Saros Bay, The North Aegean Sea	Eastern Mediterranean Sea	Adriatic Sea	Specimen 1 NE Aegean Sea	Specimen 2 NE Aegean Sea	Specimen 3 Korinthiakas Gulf
Total length	558	651	690	800	533	565	790
Total weight	2623 (ca)	4652	4000	7883	1649	1703	5020
Fork length	544	620	640	760	-	-	-
Head length	98	118	104	120	105	111	131
Interdorsal space	123	113	146	145	87	112	141
Precaudal length	457	522	560	630	-	-	-
Prefirst dorsal fin length	147	155	165	173	118	122	142
Presecond dorsal fin length	359	422	425	480	302	353	421
Prepectoral fin length	115	120	103	125	91	102	128
Pectoral fin anterior margin	84	112	132	130	-	-	-
First dorsal anterior margin	114	123	133	165	-	-	-
First dorsal height	68	80	94	103	76	78	83
First dorsal base	87	82	86	145	95	102	138
Second dorsal anterior margin	68	98	104	125	-	-	-
Second dorsal height	48	66	112	82	44	64	66
Second dorsal posterior margin	46	56	69	95	-	-	-
Second dorsal base	46	65	63	95	62	79	86
Pelvic anterior margin	52	54	69	77	-	-	-
Pelvic height	48	45	63	61	-	-	-
Pelvic posterior margin length	44	62	73	101	-	-	-
Pelvic base	38	52	50	65	-	-	-
Dorsal caudal margin	104	122	119	140	-	-	-
Terminal caudal margin	26	35	40	49	-	-	-
Reventral caudal margin	53	75	78	90	-	-	-
Caudal peduncle height	25	27	28	31	22	25	31
Head height	64	89	58	70	65	93	89
Trunk height	80	110	126	160	90	103	103
Abdomen height	90	122	100	140	92	122	146
Eye length	18	24	25	25	-	-	-

When we investigate the previous records, we see that *O. centrina* was especially caught by trawl fisheries in Turkey in the last twenty years [15, 16, 19, 20, 28-32]. There is one record showing the catch by gill nets through the same period [20]. Also, it had been reported that individuals caught in the Marmara Sea were generally caught in the north of the Marmara Sea. This study is the first record showing that this species can be accidentally caught by trammel nets used to catch demersal species in the South of the Marmara Sea.

Some Turkish fishermen leave their trammel nets in the water for extended periods without lifting them. On the shores of the Southern Marmara Sea, this period can last up to 7 days. At the same time, these nets continue to capture fish and other marine animals under the control of a fisherman in those periods. This situation causes the effect of ghost fishing or derelict fishing gear "lost or abandoned fishing gear and continues to capture fish" [33-35]. In addition to commercial species, endangered non-commercial species such as *O. centrina* may be caught in these nets. Fishermen state that some of these species caught in the net is released alive. Even though the species caught in the net are hardy and can live for a long time, removing the nets for a long soaking time can cause significant damage or death. In addition, the long stay of the nets in the water causes the fish caught in these nets to be attacked and damaged by parasites (isopods) species in the region. Scientific researches show that some species of isopods pose a threat to Turkey fisheries [36, 37]. The same situation was observed in our study, and the captured shark individual was found to have been attacked by some parasites.

The focus of this research is on the occurrence of *O. centrina* as bycatch in trammel net fishing. As a result, some biologic parameters of critically endangered species, such as limited information about angular rough shark as bycatch in fisheries should be investigated. Fishing methods will prevent catching angular rough sharks are improved and their survival should be ensured through appropriate protective measures.

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