

RESEARCH ARTICLE

Occurrence of the lesser spotted dogfish (*Scyliorhinus canicula* Linnaeus 1758) in the international waters of Mersin Bay, Turkey.

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ABSTRACT

Eighty-five specimens of the lesser spotted dogfish, *Scyliorhinus canicula* Linnaeus, 1758, was caught by a bottom trawl in the international waters of the Mersin Bay in May 2018. Some of the caught individuals were preserved in 4% formalin and was deposited in the Museum of the Systematic, Faculty of Fisheries, Mersin University, (catalogue number: MEUFC-18-11-079). The depth of sampling area is between 274 and 641 m. A total of 13 trawling operations were carried out. The total number of caught individuals was 85 and on average 5 individuals were caught in each operation. The other cartilaginous fishes caught apart from *S. canicula* were *Galeus melastomus* (1 individual), *Squalus acanthias* (4 individuals), *Etmopterus spinax* (11 individuals) and *S. canicula* made up 84.16% of all cartilaginous fishes which were caught.

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Introduction

Scyliorhinus canicula is a small shark species belonging to the family of the Scyliorhinidae of the Carchariniiformes order. This shark's second dorsal fin is much smaller than the first. Its body is large, fairly chunky, and its dorsal part is characterized by black spots and sometimes small white spots in different sizes. Its lower jaw has only labial furrows and its small anterior nasal flaps reach the mouth (Compagno, 1984). *S. canicula* and *S. stellaris* cannot be easily

identified with the reason that they are very similar to each other. Anterior nasal flaps of *S. stellaris* don't reach the mouth. This is an important morphological difference that is distinctive for the two species.

It has been reported that *S. canicula* is found both in coastal and open waters on rocky bathyal bottoms or corals. Tough *S. canicula* distributes between 10 m and 780 m depth, its distribution is typically 80 to 100 m depth. While it can be found up to 400 m (Muus and Nielsen, 1999) in the Mediterranean Sea, this species inhabits up to 780

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m in the Ionian Sea (Mytilineou et al., 2005). It feeds invertebrates like Crustaceae and Mollusca and demersal bony fish species (Froese and Pauly, 2018). *S. canicula* is consumed by people. This species is consumed as fresh or salted and dried fish by humans, is also converted into fish meal (Froese and Pauly, 2018).

Its maximum total length is reported as 100 cm (Compagno, 1984), the common adult length is 60 cm (Muus and Nielsen 1999), and the average size at first sexual maturity is 57 cm which ranges from 41 to 64 cm (Froese and Pauly, 2018). This is an oviparous species, with a single egg laid at a time per oviduct (Compagno, 1984). It eggs in spring and summer seasons. They also leave their eggs on algae in the subtidal or intertidal zone (Ellis and Shackley, 1997).

S. canicula distributes in the Northeast and Eastern Central Atlantic and Mediterranean Sea, and it continues to the Shetland Isles and Southern Norway to the north and Senegal to the south. There is no distribution of this shark species in the Black Sea (Compagno et al., 2005). *S. canicula* was categorized as least concern (LC) in the IUCN Red List of Threatened Species 2009 (Ellis et al., 2009). It is difficult to assess the effects of fisheries on *S. canicula* populations in the Mediterranean Sea due to lack of species specific reports. Besides, this shark species has a high post survival rate as a discard species among the species (Ellis et al., 2009). Overfishing and habitat degradation seem to be the main factors responsible for the reduction of deep-sea demersal species in the Northeastern Mediterranean Sea. In this study, it was determined the distribution and density of *S. canicula* in the international waters of the Mersin Bay, Northeastern Mediterranean Sea.

Material and Methods

Deep-sea sampling by means of trawl was carried out in the international waters of the Mersin Bay between 14 and 17 May 2018 by a commercial trawl. The depth of sampling area is between 274 and 641 m. Coordinates of the sampled area: 36.24853N-34.36491E, 36.18839N-43.38847E, 36.17065N-34.40686E, 36.07227N-34.53326E (Figure 1). A total of 13 trawling operations were carried out. Each trawl operation lasted approximately 4 hours. During the sampling, eighty-five specimens of the lesser spotted dogfish was caught. Some specimens were preserved in 4% formalin and was deposited in the Museum of the Systematic, Faculty of Fisheries, Mersin University, (catalog no: MEUFC-18-11-079) (Figure 2). Taxonomic identification was based on diagnostic characters provided by Compagno (1984). All morphometric measurements were done to the nearest 0.01 cm using dial calipers (Table 1).

Results

In the study, 85 individuals of *S. canicula* were caught in 13 trawling operations at a depth of 274-641 m from the open waters of the Mersin Bay (Figure 2). The mean length of the individuals is 32.3 cm and the mean weight is 117.302 g. Some morphometric measurements of the species were done and presented in Table 1.

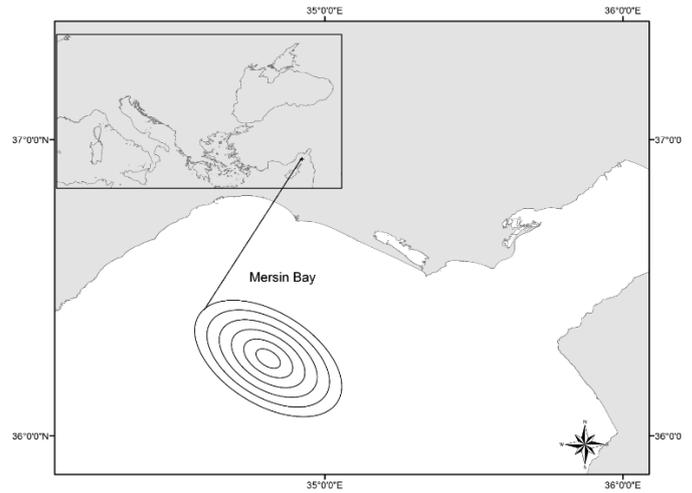


Figure 1. The shaded area indicates the locations where the specimens were caught.



Figure 2. Specimens of *S. canicula* from the international waters of the Mersin Bay, Turkey.

Discussion

The mean length of the individuals caught in this study is 32.3 cm which ranges from 30 to 33.5 cm (Table 1). The size at first sexual maturity is 57 cm which ranges from 41 to 64 cm (Froese and Pauly, 2018). This indicates that all the individuals caught in the sampling area are immature.

While it can be found up to 400 m (Muus and Nielsen, 1999) in the Mediterranean Sea, this species inhabits up to 780 m in the Ionian Sea (Mytilineou et al., 2005). According to our findings, the distribution of this species is between 274 and 641 m, and this finding is similar to the literature. In this study, it was also determined that immature individuals of this species may be found at the depth of 641 m in the international waters of Mersin Bay. Baino and Serena (2000) reported that the juvenile individuals of the *S. canicula* are found especially on the upper slopes (~ 200 m). Researchers also reported that nursery ground is located on the seabed at depths of about 200 m. It can distribute at different depths depending on the maturation stages of *S.*

canicula. Younger individuals live in deeper areas, while adults are scattered in shallow water. This may indicate that *S. canicula* shows a reproductive migration, depending on depth. Furthermore, distribution of immature individuals in the deep-sea can be explained by overfishing and predator pressure.

Table 1. Some biometrical measurements expressed as a percentage of TL in *S. canicula*.

Parameter	Present study (n=85) Min- max	Moftah et al. 2011 (n=4)
Pelvic length/TL %	10.49-11.88	-
Interdorsal space/TL%	12.65-14.19	-
Mouth width/TL%	5.29-5.94	-
Mouth length/TL%	4.52-5.31	-
Interorbital space/TL%	5.88-7.10	-
Precaudal-fin length/TL%	77.42-81.19	78.69
Predorsal-fin length/TL%	49.33-52.31	49.04
Prepectoral-fin length/TL%	15.67-20.62	15.54
Prepelvic-fin length/TL%	39.35-41.19	38.39
Preanal-fin length/TL%	58.08-61.49	57.73
Body depth/TL%	8.62-10.33	6.82
Head length/TL%	12.26-14.33	16.79

We found that some biometric measurements of *S. canicula* in our study were similar to some biometric measurements obtained in the other study (Moftah et al., 2011) except for body depth/TL% and head length/TL% (Table 1). Both studies were conducted on the Eastern Mediterranean Sea population of this species. The researchers obtained individuals of *S. canicula* by catching in the Alexandrian waters of Egypt (Moftah et al., 2011). Besides, the ratios of two biometric measurements are different in both studies. The reason for these measurement ratios being different may be as follows: head length and body depth is not a good biometric measurement point; have less certainty than other biometric measurement points; measurement errors are made for this reason.

It was reported that in the 28% of 6336 trawling operations during the International Bottom Trawl Survey in the Mediterranean (MEDITS) in the 1994-1999 years, *S. canicula* specimens have been caught (Baino et al., 2001). During the Gruppo Nazionale Risorse Demersali (GRUND) project, 22 trawling operations were carried out in Italy between 1985-1998 years (Relini et al., 2000). In these surveys of the GRUND project, *S. canicula* was the 2th species in terms of frequency of occurrence in the obtained species composition. Other sharks, *G. melastomus* and *S. stellaris*, were found in the 1th and 18th ranks, respectively (Relini et al., 2000). Both catching rates for *S. canicula* were high in the MEDITS surveys and GRUND project, and this species also was caught in all 13 trawl operations in the present study. The total number of caught individuals was 85 and on average 5 individuals were caught in each operation. Other cartilaginous fishes caught apart from *S. canicula* were *G. melastomus* (1 specimens), *S. acanthias* (4 specimens) *E. spinax* (11 specimens) and *S. canicula* was made up 84.16% of all cartilaginous fishes. *S. canicula* is widespread in the East Atlantic and Western Mediterranean Sea according to the

literature; and it is also determined that its distribution is intense in the international waters of Mersin Bay in the Northeastern Mediterranean.

Conclusion

Immature individuals of *S. canicula* were only found in this study conducted in open waters of the Mersin Bay. This situation can be explained by the fact that immature is distributed in deep waters in order to avoid the predator and hunting pressure until the maturation period.

Conflict of Interest

The authors declare that there is no conflict of interest.

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