



RESEARCH ARTICLE

The blue crab (*Callinectes sapidus*, Rathbun, 1896) is spreading in the southern coast of the Black Sea

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ABSTRACT

The natural fauna of the Black Sea changes due to the entrance of different origin species. One of them is the blue crab that the first location information of which reported in 1968 on the Black Sea. Location records of blue crabs have been found in the southern coasts of the Black Sea in recent years. A total of 451 hauls were performed with the hydraulic dredge fishing gear to detect the existence of the blue crab on the coast of Sakarya (Southern Black Sea). Two female individuals were caught (carapace length: 70.09 cm, width: 15.69 cm, weight: 166.9 g; carapace length: 83.42 cm, width: 188.89 cm, weight: 272.1 g). Especially when the location records in recent years are examined, it is seen that this species is spreading to the southern coasts of the Black Sea. The probability of reproduction and adaptation in the Black Sea should be explored by diving and a blue crab-oriented study with traps or diving.

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Introduction

It is well known that the natural fauna of the Black Sea has changed because of the entrance of species with different origins (Pashkov et al., 2012). The deep current from the Sea of Marmara to the Black Sea has carried the salty waters of the Mediterranean to the Black Sea. The increase in water temperature due to both the deep current and climate change make the environmental conditions more suitable for the species of Mediterranean origin the Black Sea. Besides,

increased human activities and maritime transport play a role in moving species to other regions. Therefore, it has been reported that many alien species have recently found in the Black Sea (Shefer et al., 2004; Şahin et al., 2009; Sağlam et al., 2011; Turan et al., 2016).

The blue crab (*Callinectes sapidus* Rathbun, 1896), originating from the West Atlantic, was first recorded in the early 20th century in Europe and then in 1949 in the Mediterranean Sea (Enzenroß et al., 1997). It has been reported that the blue crab, which has been reported in different

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locations in the Aegean, Marmara and the Black Sea, is generally spread by ballast waters of the ship (Nehring, 2011). The *Callinectes sapidus* is euryhaline, so the salinity value of the Black Sea is not a criterion that limits its habitat (Guerin and Stickle, 1992). The blue crab, which is emphasized to have an important role in the structure and functioning of the food chain in benthic areas in the west of the Atlantic, is defined as an invasive species for the Mediterranean (Zenetos et al., 2005). Accordingly, it is assumed that this species may have negative effects on the aquatic ecosystems (Sharov et al., 2003). Besides, the small-scale fishing of economically valuable blue crab consumed by humans will naturally be developed in the new area. (Ayas and Özoğul, 2011; Mancinelli et al., 2017). In the literature, this species has been reported in 15 different locations in the Black Sea (Aydın, 2017). Recent studies have shown that it is especially recorded on the southern coast of the Black Sea. In this study, it was aimed to compile the records of the distribution of blue crab in the Black Sea and to give two new location records of the blue crab in the Black Sea.

Material and Methods

It was heard that a few blue crab specimens were caught with hydraulic dredge sand mussels and thrown into the sea on the coast of the western Black Sea, Sakarya, Turkey (Figure 1).

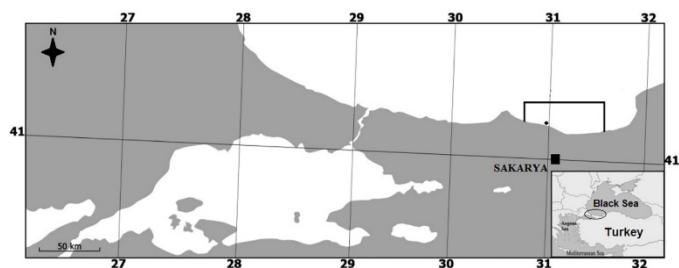


Figure 1. Sampling location (The black dot indicates two new localities)

A meeting was held with the crew of two fishing vessels (1: Sinyor Paşa, 2: Fehmi Reis) to confirm the presence of species in the region and the researcher participated in trips of vessel-1 (December 27-28, 2019- 5-7 January 5-7, 2020) (Figure 2). Observations on vessel-2 were made by the crewmember, and two female individuals (♀♀) were found. The first specimen was caught on December 27, 2019 at 10:35 AM (41° 08' 411" N, 30° 32' 557" E) with the first fishing vessel at a depth of 7 m. The second specimen was caught with the second one at a depth of 11 m at 08:15 AM on December 28, 2019 (41° 09' 484" N, 30° 30' 112" E).

All caught in the collection box were checked in each hauls. The samples obtained in this study were frozen and transferred to Recep Tayyip Erdogan University, Faculty of Fisheries

Laboratory and length and weight measurements were carried out in the laboratory.



Figure 2. Fishing vessels used in the research

Results

A total of 451 operations were performed (45-58 hauls in each day) and the total haul time was recorded as 3608 minutes. In all hauls, the prey collected in the collection box was sampled and two individuals (female) were caught. The individuals have 70.09 cm carapace length, 15.69 cm width, 166.9 g weight and 83.42 cm carapace length, 188.89 cm width, 272.1 g weight, respectively (Figure 3). Taxonomic classification was performed according to Williams (1974).

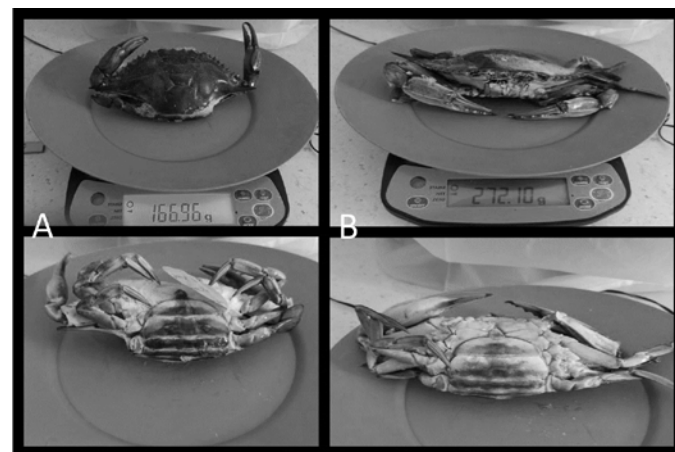


Figure 3. Sampled *Callinectes sapidus* specimens (A: 1, B: 2)

Discussion

The blue crab was first recorded in the Bulgarian coast of the Black Sea in 1968 and then was reported in 11 different locations of the Black Sea until 2014 (Table 1).

According to the records from the southern coasts of the Black Sea, it is understood that the first record was reported in 2014 and then it has been reported from 6 different locations in the last 6 years together with this study (Ak et al., 2014; Yağlıoğlu et al., 2014; Aydın, 2017).

Some researchers reported that the entrance of the blue crab into the Black Sea was provided with ballast water of commercial ships, while others reported that it entered with natural ways. In particular, it is reported that the absence of

Table 1. Location data of blue crab for Sea of Azov and Black Sea

Study	CW	CL	Depth (m)	Fishing method	Location
Bulgurkov (1968)*	16.6	7	5-6	NA	Varna Bay
Shaverdashvili and Ninua (1975)*	19.4	7.5	8-10	Three walled fishing net	Poti
Zaitsev (1998)*	17 20.5	NA	NA	NA	Kerch Strait
Monin (1984)*	20	8	20	NA	Cape Bolshoi Utrish
Zaitsev (1998)*	NA	NA	NA	NA	Varna Bay
IMO (2002)*	NA	NA	NA	NA	Romanian
Diripasko et al. (2009)*	NA	NA	NA	NA	Sea of Azov
Diripasko et al. (2009)*	15	7.5	NA	NA	Sea of Azov
Khvorov (2010)*	18	7	30	NA	Crimean
Diripasko et al. (2009)*	14	7.3	NA	NA	Sea of Azov
Pashkov (2012)	20	8.1	5-6	Gillnet	Lazarevskoye
Yağlıoğlu et al. (2014)	NA	NA	14	Gillnet	Düzce/Turkey
	NA	NA	18		Zonguldak/Turkey
Ak et al. (2014)	19.1	9	8-12	Gillnet	Trabzon/Turkey
Aydın (2017)	19.4 19.6	NA	2-10	Trammel net	Ordu/Turkey
Present study	18.9	83.4	7	Hydraulic dredge	Sakarya/Turkey
	15.7	70.1	11		Sakarya/Turkey

Note: * Information is quotation from Pashkov (2012), CW: Carapace width, CL: Carapace length, NA: No information.

juvenile and adult individuals with eggs seems to support the first theory (Aydın, 2017). On the other hand, Pashkov (2012) reported that the blue crab entered the Black Sea from the Mediterranean basin with both ballast waters and natural ways. Especially the fact that there are too many records on the South coast in a short time strengthens the possibility of spreading with natural ways and reveals the suspicion that it adapted to the Black Sea. Because it is known that adult individuals are very good swimmers so they can migrate new areas hundreds of kilometers away (Castrìota et al., 2012).

Almost all records were caught by fishing gears as non-target and a research focus on this species was not conducted. Therefore, questions about the entrance of this species have to remain unanswered. Therefore, it is necessary to investigate the existence of juveniles and the possibility of reproduction of blue crab in the Black Sea by sampling with dives and traps in possible habitats.

Conclusion

The Black sea, which is poor in terms of species diversity, is very vulnerable to alien species. Due to its low salinity, species with less tolerance against environmental factors can settle in

this region. Hence, measures must be taken and operated to prevent foreign species that can be transported by the commercial activities of ships from entering this region. Otherwise, much effort will have to be put to understand the effects of an invasion and to struggle with it.

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Compliance with Ethical Standards

Conflict of Interest

The author declares that there is no conflict of interest.

Ethical Approval

For this type of study, formal consent is not required.

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