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First record of the benthopelagic fish John dory *Zeus faber* (Linnaeus, 1758) in the Black Sea coasts of Türkiye

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ABSTRACT

In this study, a male specimen of John dory (*Zeus faber*) with 31.4 cm in total length and 365.43 g in body weight was caught with a trammel net at a depth of 15 m from Fener Island in the province of Fatsa (Ordu, Black Sea). This record is the first verified report suggesting that John dory expanded its distribution in the Mediterranean towards the Geographical Sub-Area 29 (Black Sea).

Keywords: Zeidae, Geographic expansion, New record, Ichthyofauna, Black Sea, Türkiye

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Introduction

The Zeidae family (Rafinesque, 1815) is an important ecological component of global marine and brackish waters in muddy substrates. Zeidae is widely distributed near or directly over the sea floor but occasionally in midwater. The family comprises large, showy, deep-bodied marine fishes occurring in benthopelagic waters of oceans, including a limited number of species and assembling low biomass (Grande et al., 2018). The family includes just six species in two genera (Nelson, 1994), and only two are found in the Mediterranean (Froese & Pauly, 2022).

The John dory, *Zeus faber* (Linnaeus, 1758), is widely distributed Atlantic, Indian, and Pacific Oceans and along the entire West African coast (Wheeler, 1969; Dunn, 2001; Vrgoč et al., 2006; Choi et al., 2011; Iwamoto, 2015). This species spreads to a depth of 400 m but commonly occurs between 25-160 m (Iwamoto, 2015). The John dory has a laterally compressed body, but it is distinguishable from the other species by a large round black spot on its body sides. The body of the John dory is covered with such small rudimentary scales that it appears naked (Quéro, 1986). This species' maximum size and age are 90 cm (Iwamoto, 2015) and 18 years (İşmen et al., 2013), respectively. It is usually caught by bottom trawl net, long line, or trammel net close to the bottom in the fisheries areas (Jardas, 1996) but is mainly considered a valuable by-catch (Dunn, 2001; İşmen et al., 2013; Kim et al., 2020). This species is used in commercial fisheries for human consumption, fish meal, and oil (Iwamoto, 2015).

There are various studies on the distribution of John dory in Turkish territorial waters on the shores of the Mediterranean (Başusta & Erdem, 2000; Çiçek et al., 2006; Başusta & Başusta, 2021), Aegean Sea (Torcu & Aka, 2000; Akyol, 2001; İşmen et al., 2013; Bilge et al., 2014) and Marmara Sea (Keskin & Eryılmaz, 2010; Karadurmuş, 2022). The occurrence of John dory on the Turkish coasts of the Black Sea is reported in various marine fish checklists (Bilecenoğlu et al., 2002; Keskin, 2010; Bilecenoğlu et al., 2014) referring to Ninni (1923). In the last case, there is no evidence of its existence on the Turkish coasts of the Black Sea, and local fishermen have verified the first existence of this species. In this paper, we report the first documented record of *Z. faber* on the Turkish coasts of the Black Sea, providing detailed capture and biological data and discussing its mechanisms of introduction.

Material and Methods

A male specimen of *Z. faber* was sampled on January 27, 2023, in the Fatsa Gulf (41°03'42.5" N − 37°31'00.3" E) (Figure 1) located in General Fisheries Commission for the Mediterranean (GFCM) Geographical Sub-Area 29 (the Black Sea). The sampling location was 520 m away from Fener Island in the central province of Fatsa, Ordu. The specimen was captured at a depth of 15 m during an experimental biodiversity survey using an artisanal trammel net with 80 mm inner and 280 mm outer panel mesh size. During sampling, water salinity and surface sea temperature were measured at 17.9 ‰ and 11.2 °C, respectively. The specimen was initially identified using the taxonomic keys of Fischer et al. (1987), and its scientific name was checked from FishBase (Froese & Pauly, 2022). Total length (TL) was measured using an ichthyometer with 0.1 cm precision, while body weight (W) was weighed using a scale with 0.01 g precision. Sex distinction was made according to the shape and color of gonads (Gunderson, 1993).

Results and Discussion

John dory is distributed in the Indian Ocean, the eastern Atlantic from Norway to South Africa, the Mediterranean Sea, the South and East China Seas, and the western Pacific in southern Japan, New Zealand, Australia, and Korea (Wheeler, 1969; Jardas, 1996; Yoneda et al., 2002; Choi et al., 2011). Several studies refer to its wide-range occurrence in the Adriatic Sea (Vrgoč et al., 2006), the entire West African coast (Yoneda et al., 2002), and off Mauritania (Iwamoto, 2015). This paper reports the first documented record of *Z. faber* on the Turkish coast of the Black Sea. The current record essentially expands the species' distribution area and discusses its potential for spread. In recent years, the Black Sea's biological, chemical, and physical properties have been changing through the impact of global climate change and the Red Sea and the Suez Canal. This situation defines the "Mediterraneanization" of the Black Sea (Oğuz & Öztürk, 2011). It is estimated that this change will contribute to the inclusion of John dory in the Black Sea ecosystem and support its subsequent spread.

The TL and W of the specimen were measured as 31.4 cm and 365.43 g, respectively (Figure 2). The sex was identified as male based on the macroscopic observation of the gonads – flat, white-cream in color, and soft-textured. John dory reaches maturity at 4-5 years of age (Jardas, 1996; İşmen et al., 2013) and between 26 cm and 37 cm in length (Dorel, 1986; Dunn, 2001; Vrgoč et al., 2006). The existence of a mature individual of this size seems promising for the potential continuity of stocks in the Black Sea. Maravelias et al. (2007) reported the bottom sea temperature, water depth, and latitude as the species' spatial aggregation determinants in all

seasons. John dory lives up to a depth of 400 m, although abundance is most significant in shallow (<80 m) and warmer waters (>16.5°C) characterized by weak hydrographic activity (Maravelias et al., 2007). It prefers warm waters for spawning (Akyol, 2001). The Turkish coast of the Black Sea, which represents the main shelter area for many species with coastal dunes, wetlands, reefs, and islands, is host to diverse and rich habitats (Öztürk et al., 2013). With an annual average surface water temperature of 16.3°C (quoted from the Turkish State Meteorological Service) and nutrient abundance (Öztürk et al., 2013; Zengin, 2019), the Black Sea can provide suitable conditions for the life of the species. The presence of hydrogen sulfide at a depth of more than 150 m in the Black Sea is considered a limiting factor for the distribution of this species (Algan et al., 2002).

The specimen was dissected according to Hyslop (1980) to analyze the stomach contents of the fish. The sample's stomach was fully empty, so we cannot infer its feeding behavior at the sampling site. John dory is an opportunistic piscivorous predator that takes advantage of abundant and diverse prey items, from cephalopods to Pisces (Choi et al., 2011; An et al., 2012; İşmen et al., 2013; Kim et al., 2020). John dory is capable of stalking enough to consume selected prey fish in a group or school (Ressell, 1983). Prey items cover the entire water column, and their diet varies by region, habitat, and size (Ressell, 1983; Stergiou & Fourtouni, 1991; Kim et al., 2020). The Black Sea is very rich in Pisces, such as whiting, sardines, horse mackerel, anchovy, picarel, bogue, and gobies (Aydın & Karadurmuş, 2012; Gücü et al., 2017; Karadurmuş et al., 2021a), which are the main prey of John dory. (Silva, 1999; Kim et al., 2020). The variety and abundance of preys in the Black Sea can provide a vital feeding opportunity for the species. The presence of crustaceans, cephalopods, and anthozoa species that the species prefers will also support the species' feeding. Its main predators are sharks (Mendonça, 2009) and large bony fish (Morte et al., 1997). Cartilaginous fish, sturgeon, and some bony fish found in the Black Sea can be considered possible predators of John dory.

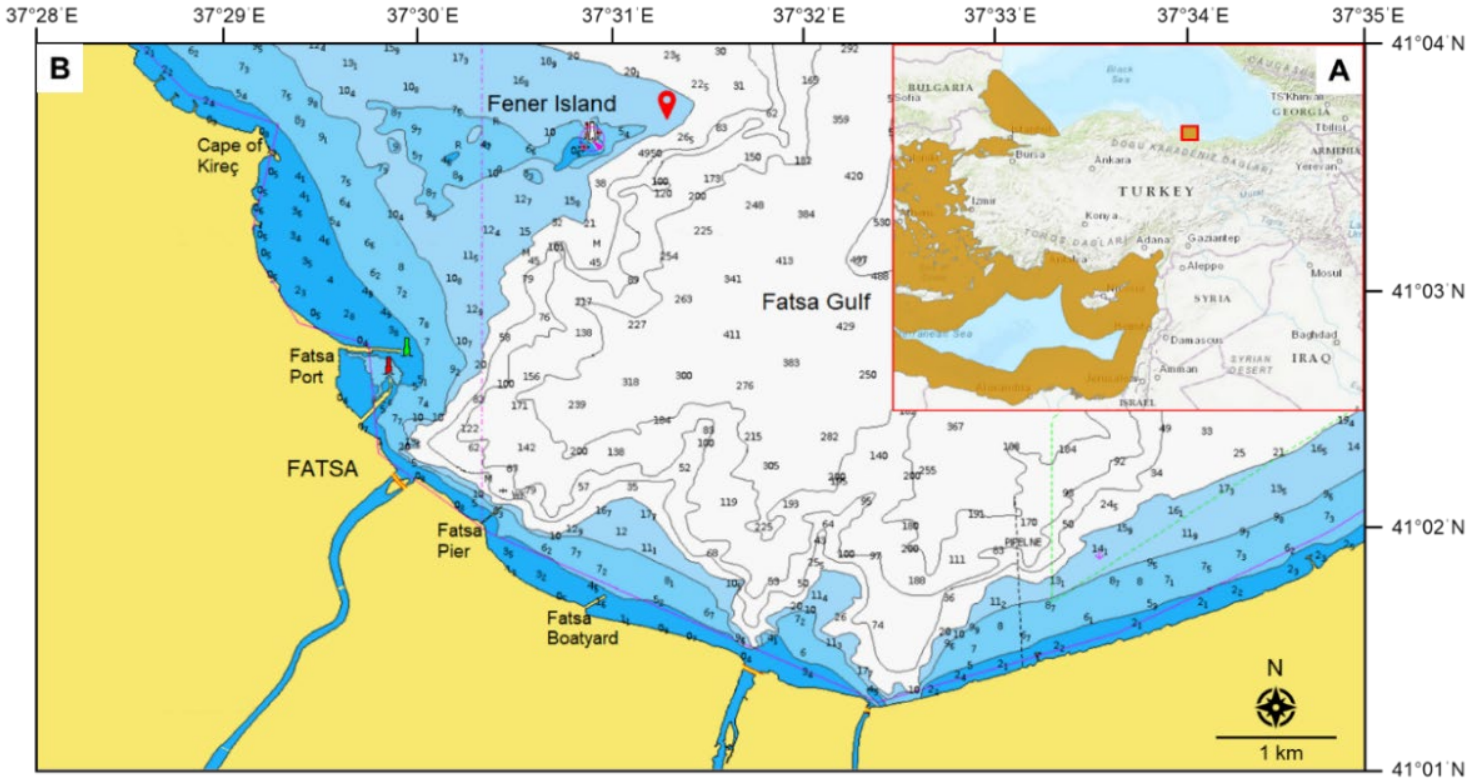

Figure 1. Study map. The extant residence of *Zeus faber,* compiled by IUCN (continuous orange areas in part A), represents the sampling region (the orange area in the red frame in part A), geographic location of the sampling point (red mark in part B)

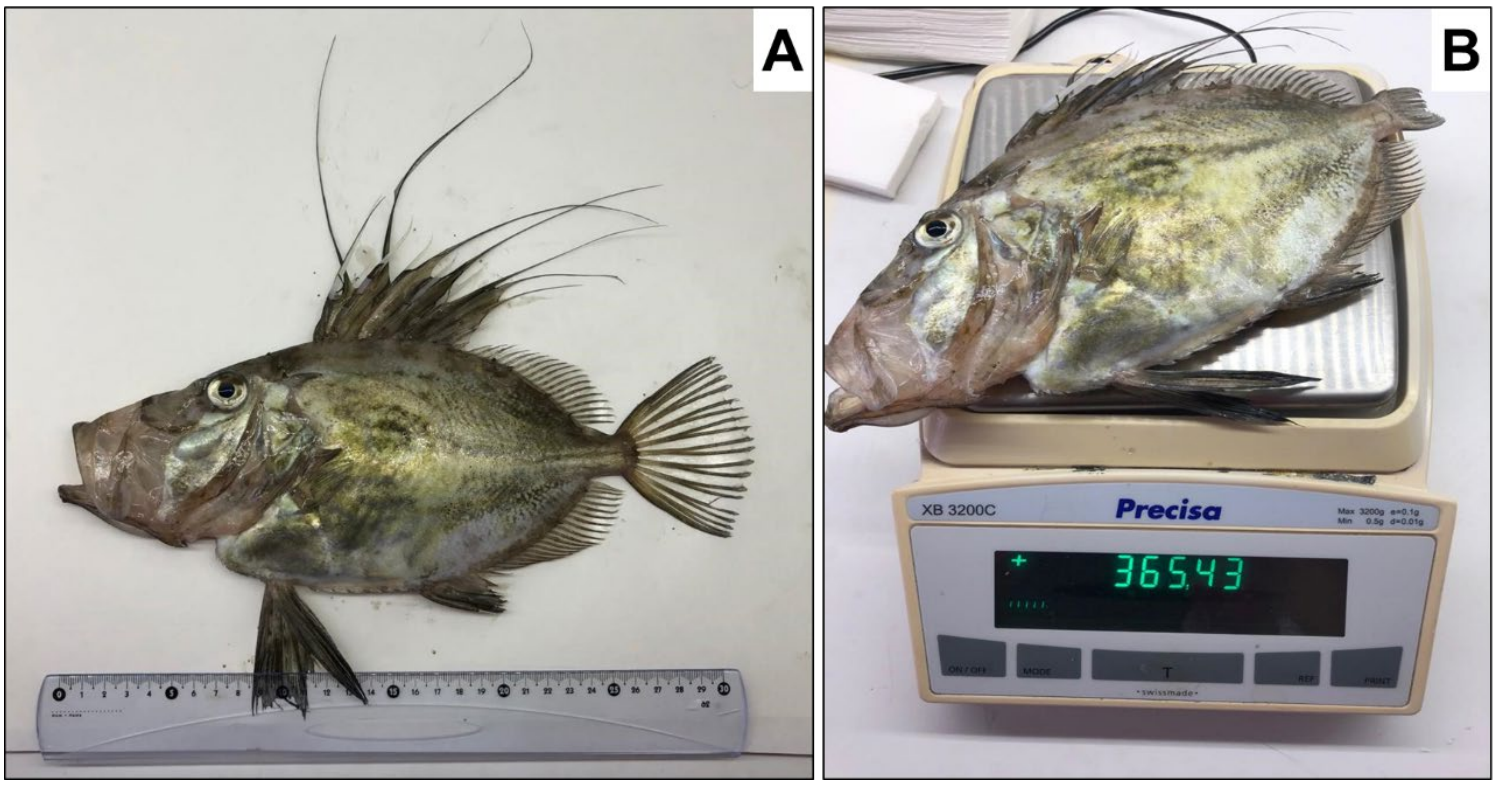

Figure 2. *Zeus faber*, 31.4 cm in total length (A) and 365.43 in body weight (B), was sampled from Fatsa Gulf on January 27, 2023.

John dory is vulnerable to bottom trawling and longline fishing (Fischer et al., 1987; Jardas, 1996). The species is under pressure due to overfishing and inefficient fishing regulations in the Sea of Marmara. For this reason, Bilecenoğlu et al. (2016) have evaluated John dory in the list of bony fish species that need immediate conservation action in the Sea of Marmara. It is also caught by-catch in commercial shrimp fishing with beam trawl (Karadurmuş, 2022). Researchers (Jukic-Peladic et al., 2001; Vrgoč et al., 2006) point to decreased biomass indices in the Mediterranean and the Adriatic Sea due to overfishing. This species is classified as the "Least Concern" for the Mediterranean in the red list of endangered species reported by the International Union for Conservation of Nature (Iwamoto, 2015). There are no species-specific conservation actions in place for John dory; however, the range for this species coincides with several marine protected areas (Iwamoto, 2015).

Conclusion

In recent years, fish species that settled in the Black Sea ecosystem with the effect of global climate change are in constant change (van der Voo, 1990; Aydın & Sözer, 2016; Aydın & Bodur, 2018; Zengin, 2019; Aydın, 2020; Karadurmuş et al., 2021b). John dory can increase the biomass level on the Turkish coast of the Black Sea and become a sustainable fishery resource within a productive habitat in the long term. In this context, we advise local fishermen to be sensitive to the conservation of John dory individuals.

Compliance with Ethical Standards

Conflict of interest: The authors declare that for this article, they have no actual, potential, or perceived conflict of interest.

Ethics committee approval: Ethics committee approval is not required.

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Disclosure: -

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