



## First Evidence-Based Record of Common Pandora *Pagellus erythrinus* on the Turkish Coast of the Black Sea

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**Abstract** This paper documents the first evidence-based record of the common pandora (*Pagellus erythrinus*) from the Turkish coast of the Black Sea, with specimens sampled during 2024. The samples were collected from four locations along the Black Sea coast, from Şile in the west to Perşembe in the east, at depths of 10–17 m in rocky habitats. The study suggests that the common pandora likely entered the Black Sea via the Bosphorus, a natural biological corridor linking the Sea of Marmara and the Black Sea. The recent warming of Black Sea waters and the ongoing process of Mediterraneanization, which facilitates the northward spread of species, are additional contributing factors. Biometric analysis of the specimens revealed total lengths ranging from 20.7 cm to 26.4 cm and body weights between 101.7 g and 248.5 g, confirming that all individuals were mature adults.

**Keywords:** New record, non-indigenous species, range expansion, Sparidae, citizen science, Türkiye.

## Karadeniz'in Türkiye Kıyılarında Kıрма Mercan *Pagellus erythrinus*'un Kanıta Dayalı İlk Kaydı

**Öz:** Bu makalede, 2024 yılında yakalanan örneklerle, Karadeniz'in Türkiye kıyılarındaki kıрма mercanın (*Pagellus erythrinus*) ilk kanıta dayalı kaydını belgelemektedir. Örnekler, batıda Şile'den doğuda Perşembe'ye kadar Karadeniz kıyısı boyunca dört lokasyondan, kayalık yaşam alanlarında 10-17 m derinliklerde örneklenmiştir. Çalışma, kıрма mercanın Karadeniz'e muhtemelen Marmara Denizi ile Karadeniz'i birbirine bağlayan doğal biyolojik koridor olan İstanbul Boğazı aracılığıyla girdiğini öne sürmektedir. Karadeniz sularının son zamanlarda ısınması ve türlerin kuzeye yayılmasını kolaylaştıran Akdenizleşme süreci bu geçişe katkıda bulunan faktörlerdir. Örneklerin biyometrik analizi, toplam uzunluklarının 20,7 cm ile 26,4 cm arasında değiştiğini ve vücut ağırlıklarının 101,7 g ile 248,5 g arasında değiştiğini ortaya koyarak tüm bireylerin olgun yetişkinler olduğunu doğrulamaktadır.

**Anahtar kelimeler:** İlk kayıt, yabancı tür, menzil genişlemesi, sparidae, vatandaş bilimi, Türkiye.

### INTRODUCTION

The common pandora (*Pagellus erythrinus* Linnaeus, 1758) is a member of the Sparidae family, which includes 164 species worldwide across 39 genera (Fricke et al., 2024). A total of 26 species from this family have been recorded in Turkish waters (Bilecenoğlu, 2024). The common pandora is a gregarious demersal species inhabiting rocky, sandy, and muddy sea bottoms, typically at depths of

20–300 m, although it has been found as deep as 320 m in certain areas (Bauchot et al., 1987; Froese & Pauly, 2014). Its distribution varies with size, ranging from shallow coastal waters to deeper regions of the continental shelf (Spedicato et al., 2002). While it is commonly found between 10 and 100 m in the Adriatic Sea and other Mediterranean Sea subregions, its habitat preferences and adaptability make it a key species in benthic and pelagic ecosystems. The common

pandora exhibits a lifespan of up to 21 years, with the largest recorded specimen reaching 58 cm in total length (Crec'hriou et al., 2012). It is a protogynous hermaphrodite, starting life as a female and transitioning to male after its third or fourth year (Buxton & Garratt, 1990). Primarily a diurnal feeder, common pandora is a generalist predator with a diet that includes a variety of zoobenthic invertebrates such as Decapoda, Bivalvia, Polychaeta, and Cephalopoda (Šantić et al., 2011). Its carnivorous nature and opportunistic feeding habits contribute to its adaptability across different habitats in the Mediterranean Sea and adjacent waters. The common pandora is a commercially valuable species, targeted by trawl fleets, gill nets, trammel nets, bottom long lines, and hand lines (Metin et al., 2011). It plays a significant role in small-scale fisheries across the Mediterranean Sea, contributing to local economies due to its high market value. Despite being categorized as Least Concern by the IUCN (Russell, 2014), overexploitation in certain regions threatens its sustainability.

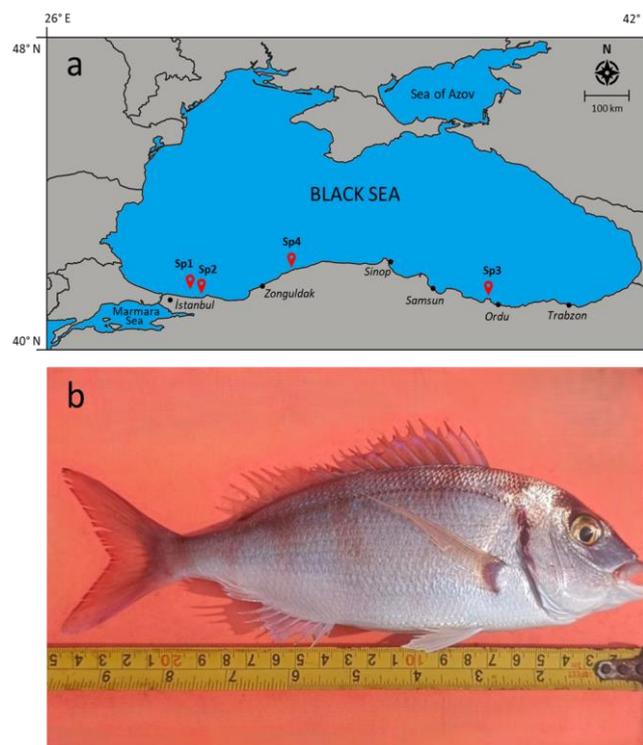
The common pandora inhabits the eastern Atlantic Ocean, extending from Norway and the southern coasts of Scandinavia to Angola, including offshore regions like the Cape Verde, Madeira, Canary Islands, and São Tomé and Príncipe (Sanz-Fernández et al., 2022). This species is commonly observed across both northern and southern waters of Mediterranean Sea, from the Strait of Gibraltar to the Eastern Basin, including the south-central regions like Tunisian waters (Papaconstantinou et al., 1988). It is commonly found in the Aegean Sea (Ayyildiz & Altin, 2018) and even widespread in the Sea of Marmara (Sarı & Karadurmuş, 2024). Although there are reports suggesting the presence of common pandora in the Black Sea, these references—dating back more than 40 years—consist of repeated citations without direct evidence to substantiate the species' occurrence in this region (Slastenenko, 1956; Bauchot & Hureau, 1986; Bonnet, 1969; Fischer et al., 1987; Froese & Pauly, 2014; Whitehead et al., 1986). Furthermore, while the species is included in some ichthyofaunal checklists for the Black Sea (e.g., Keskin, 2010; Bilecenoğlu, 2024), a review of the referenced studies (Bennett, 1835) reveals no concrete distribution data or verified findings supporting its presence in the Black Sea.

This study fills a significant gap in the ichthyological records by providing the first evidence-based documentation of the common pandora from the Turkish coast of the Black Sea. Using sampling data collected at different times during 2024, the species' presence is confirmed along a wide geographic range, extending from the western to the eastern Black Sea.

## MATERIAL AND METHOD

This study utilized a citizen science approach to collect samples of the common pandora from the Turkish

coast of the Black Sea. Small-scale commercial fishermen, operating different regions along the Black Sea coastline (Figure 1a), played an active role in this collaborative effort. Under the guidance of our research team, fishermen photographed the specimens they captured and conducted biometric measurements (Figure 1b). In addition, critical fishing information, including coordinates, depth, and the specific details of fishing gear used, was systematically recorded by the fishermen. The taxonomic level of the samples was conducted fish identification key outlined by Fischer et al. (1987), ensuring accurate species determination. To further verify the scientific nomenclature, the species name was cross-checked against FishBase (Froese & Pauly, 2024), a comprehensive global database of fish species. Biometric data included total length (TL - the length of a fish as measured from the tip of the snout to the tip of the tail) and body weight (W). TL was measured using an ichthyometer with a precision of 0.1 cm, while W was recorded using an electronic scale with a precision of 0.1 g. Both measurements were performed by the fishermen following detailed instructions provided by the research team to ensure consistency and accuracy. To better understand the habitat and environmental preferences of the species, data regarding the fishing depth and type of seabed (e.g., rocky, muddy, or sandy) were gathered through direct communication with the fishermen. The geographic coordinates of the fishing sites were logged using GPS devices to enable precise mapping of the species' distribution in the Black Sea.



**Figure 1.** Geographical records of *Pagellus erythrinus* along the Turkish Black Sea coast (a), with specimen sampled from Şile on 2nd March 2024 (b)

## RESULTS AND DISCUSSION

The samples were collected from the coast of Şile in the west to the coast of Perşembe in the east, highlighting the wide geographical distribution of the common pandora in rocky habitats along the Black Sea coast. Sampling occurred at various times throughout 2024, spanning from spring to autumn, which demonstrates the species' year-round presence in the region. Trammel nets were primarily used as the fishing gear for three specimens, while one specimen was captured using a gill net. The species was

found at depths ranging from 10 m to 17 m, suggesting that the common pandora occupies relatively shallow rocky areas along this stretch of the coast. The total lengths of the specimens ranged from 20.7 cm (Sp3) to 26.4 cm (Sp2), with an average length of approximately 23.13 cm. The specimen weights varied from 101.7 g (Sp3) to 248.5 g (Sp2), with an average weight of around 184.25 g (Table 1). These findings provide strong evidence of the occurrence of the common pandora along the Turkish Black Sea coast, confirming its presence in shallow rocky habitats.

**Table 1.** Sampling details and specimen measurements of *Pagellus erythrinus* along the Turkish Black Sea coast in 2024.

Specimen code	Location details			Sampling details			Specimen details	
	Date	Coordinate	Region	Fishing gear	Depth (m)	Habitat	TL, cm	W, g
Sp1	7.2.2024	41°12'27"N 29°33'54"E	Şile, Istanbul	Trammel net	17	Rocky	24.4	204.2
Sp2	2.3.2024	41°10'46"N 29°42'38"E	Şile, Istanbul	Trammel net	16	Rocky	26.4	248.5
Sp3	25.4.2024	41°05'41"N 37°38'18"E	Perşembe, Ordu	Trammel net	10	Rocky	20.7	101.7
Sp4	11.11.2024	41°47'08"N 32°27'57"E	Amasra, Bartın	Gill net	11	Rocky	21.0	182.6
						Means	23.1	184.3

The entry of marine organisms into new geographical areas and the subsequent expansion of their ranges can occur through several mechanisms. Species can move into new areas through their natural dispersal capabilities, such as swimming or migration (Bonanno & Orlando-Bonaca, 2019). This often happens when environmental conditions in the new area become suitable for their survival and reproduction. Currents, water temperatures, and other environmental factors can transport species from one region to another. For example, currents can carry larvae or juvenile stages of species over long distances. Anthropogenic factors, such as ballast water from ships, the aquarium trade, or aquaculture activities, can introduce species to new areas. These human-related pathways often involve the accidental release of organisms into non-native environments (Bereza & Shenkar, 2022). In the case of the common pandora entering the Black Sea, the most plausible mechanism is that the species swam into the region on its own, utilizing the Bosphorus as a biological corridor between the Sea of Marmara and the Black Sea. Over the past decade, the process known as "Mediterraneanization" of the Black Sea has accelerated (Oğuz & Öztürk, 2011), leading to an increased influx of Mediterranean species, including invasive ones, into the Black Sea. The passage of species through the Bosphorus has become more frequent due to the changing environmental conditions in the region. The species' prevalence in the Mediterranean Sea and Aegean Seas (Ayyıldız & Altın, 2018), as well as its significant biomass in the Sea of Marmara (13 kg/km<sup>2</sup>) (Sarı & Karadurmuş, 2024), supports the likelihood of its natural movement from the Sea of Marmara into the Black Sea. The fact that all sampled specimens are adults further suggests that the species likely entered the Black Sea through active swimming, rather than through passive transport mechanisms like ballast water, which typically

affects early developmental stages such as eggs, larvae, or juveniles. Additionally, the specimen collected off the coast of Perşembe in the eastern Black Sea indicates that the common pandora may have already been present in the region for some time, but its presence was not reported earlier, possibly due to underreporting or the species not being captured in fishing nets.

## CONCLUSION

This study provides the first evidence-based record of the common pandora in the Turkish Black Sea coast, documenting its presence from west to east. The findings highlight the species' potential to adapt and establish in the Black Sea's rocky habitats, facilitated by its physiological tolerance, reproductive capacity, and connectivity via the Bosphorus. The capture of exclusively adult specimens suggests that the species has successfully survived in the region and may already be colonizing, given its high fecundity and favorable environmental conditions. To understand the long-term implications of the common pandora occurrence, continuous monitoring of its population dynamics, distribution, and reproductive success is essential. Additionally, research on larval dispersal and recruitment mechanisms will help predict its future spread. Adaptive management practices, including monitoring fishery impacts and regulating catch limits if the common pandora becomes commercially valuable, will be crucial to ensure both sustainable exploitation and biodiversity conservation.

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### Compliance with Ethical Standards

**Author Contributions:** All authors contributed equally to the final version of the manuscript.

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

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**Data Availability:** The study does not contain any more data than what is presented here.

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