



## Occurrence of the Thermophilic Mediterranean Parrot Fish *Sparisoma cretense* (Linnaeus, 1758) (Teleostei: Scaridae) in Dikili Bay, Northern Aegean Sea, Turkey

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**Abstract:** On November 2019, one mature male specimen of the Mediterranean parrotfish *Sparisoma cretense* (L.) was caught by a long line in Dikili Bay. This paper declares the northernmost distribution of *S. cretense* in the northern Aegean Sea. Here, the detailed morphometric and meristic characteristics of this species are given.

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## Dikili Körfezi'nde (Kuzey Ege Denizi, Türkiye) Termofil Akdeniz Papağan Balığı *Sparisoma cretense* (Linnaeus, 1758) (Teleostei: Scaridae)'nin Bulunuşu

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**Öz:** Kasım 2019'da Akdeniz papağan balığı, *Sparisoma cretense* (L.)'nin olgun bir erkek bireyi Dikili Körfezi'nde olta ile yakalandı. Bu makale *S. cretense*'nin kuzey Ege Denizi'ndeki kuzeye doğru dağılımını açıklamaktadır. Burada, türün detaylı morfometrik ve meristik özellikler verilmiştir.

**Anahtar kelimeler:** Dikili Körfezi, Akdeniz papağan balığı, morfometri, *Sparisoma cretense*.

### INTRODUCTION

In the last two decades, the advance of thermophilic species represented the first and most cited evidence of the linkage between climate change and distribution patterns of Mediterranean Sea biodiversity (Francour et al., 1994; Riera et al., 1995). Global climate change is impacting and will continue to impact marine and estuarine fish and fisheries.

Climate warming leads species to drive their ranges north in the Northern Hemisphere (Parmesan et al., 1999; Walther et al., 2002). More than 30 Mediterranean warm-water indigenous fish species have now been pointed out the north of their original south geographical distribution and colder sectors of the basin has been reported (Dulčić & Pallaro, 2001; Guidetti & Boero, 2001, 2002; Bello et al., 2004; Azzurro et al., 2011; Kruschel et al., 2012; Perdikaris et al.,

2012). According to Azzurro (2008), the native thermophilic species appearing northern than the known range could serve as a good indicator to show the changes in seawater temperature and global heating.

Scaridae family consist of 10 genera and 88 species, two in the Mediterranean, the native *Sparisoma cretense* (Linnaeus, 1758) and the Lessepsian migrant *Scarus ghobban* Forsskål, 1775 (Golani et al., 2006; Froese & Pauly, 2018). *S. cretense* is a thermophilic marine, seagrass meadows and reef associated fish which distributes from Southern and Eastern Atlantic to the Canary Islands, Mediterranean Sea, and Turkish Seas between shallow water and about 50 meters at depth (Randall, 1990; Guidetti & Boero, 2002; Abecasis et al., 2008; Rodjan & Lewis, 2006; Lök et al., 2008; Kruschel et al., 2012; Espino et al., 2015; Louisy, 2015; Ventura et al., 2019). This distribution pattern may lead ones to think of this fish as Mediterranean thermophilic southern fish (Guidetti & Boero, 2001). The fish feeds on algae and small invertebrates (Quignard & Pras, 1986), with specialized pharyngeal bones and muscles (Monod et al., 1994; Bullock & Monod, 1997). The species commonly measures from 14 to 32 cm in total length (Petrakis & Papaconstantinou, 1990; Kruschel et al., 2012), but might grow as big as 52 cm (total length) (Pallaoro & Dulcic, 2004; Afonso et al., 2008; Oliveira et al., 2015; Filiz & Sevingel, 2015). Reproduction occurs from July to September (Petrakis & Papaconstantinou, 1990) with juveniles recruiting in late summer (Guidetti & Boero, 2002). Parrotfish is observed rarely along the Mediterranean Sea and Turkish coasts (Bianchi & Morri, 1994; Başusta & Erdem, 2000; Dulčić & Pallaoro, 2001; Torcu et al. 2001; Guidetti & Boero, 2002; Öğretmen et al., 2005; Fricke et al., 2007; Akyol et al., 2011; Azzurro et al., 2013; Bilecenoğlu et al., 2014; Çoker & Akyol, 2014; Filiz & Sevingel, 2015;

Yapıcı et al., 2016) and also recorded from Köyceğiz Lagoon/Dalyan River system and Kuşadası Gulf by Akın et al. (2005) and Lök et al. (2008), respectively.

The aim in this study, is to present as a new additional record, confirming this thermophilic Mediterranean parrotfish population to distribute northwards in northern coasts of Aegean Sea.

## MATERIAL AND METHOD

One mature male specimen (28.50 cm TL) was caught by a long line by Rıdvan Erdem Kanat from coast of Dikili Bay, northern Aegean Sea (39°4' 56" N, long 26° 48' 25"E) (Figure 1). The sample was identified at species level according to FishBase (Quignard & Pras, 1986b; Randall, 1990).

All measurements including counts and weight were carried out on fresh fish, using a digital caliper of 0.05 mm accuracy and digital balance of 0.01 g. The material was photographed, dissected and then stored in the collections of the Piri Reis Museum, University of Çanakkale. The standard and total lengths (TL and SL) were taken with a dial caliper of 0.05 mm accuracy and weight ( $\pm 0.01$  g.) was measured; the material was photographed and then, was fixed in 10% buffered formaldehyde, and subsequently preserved in 75% ethanol and deposited in the collections of the Piri Reis Museum, University of Çanakkale.

## RESULTS AND DISCUSSION

Total length and weight of this specimen were measured as 28.50 cm and 400 g. respectively. Some morphometric and meristic features of Mediterranean parrotfish are given in Table 1.

**Table 1.** Morphometric (mm, cm) and meristic features of *Sparisoma cretense* specimen captured from the coast of Dikili Bay on November 2019.

References	Abecasis et al.(2008)	Yapıcı et al. (2016)		Kampouris & Batjakas (2018)	Present Study*	
N	1	1	2	3	1	
Total length (TL)	79.23	222.0	223.0	225.0	267.57	28.50
Standard length (SL)	65.75	201.0	210.0	226.0	218.78.	24.20
Snout length	5.94	-	-	-	24.27	3.7
Head length (HL)	19.41	55.33	58.04	69.60	65.36	7.5
Body depth (BD)	19.92	60.15	61.65	73.89	71.14	8.0
Predorsal length (PDL)	-	55.26	58.63	71.43	-	-
Preanal length (PAL)	-	113.49	115.24	136.48	-	-
Caudal peduncle depth (CPD)	-	-	-	-	34.24	2.5
Preorbital length (POL)	-	18.49	22.58	29.52	-	1.7
Interorbital length (IOL)	-	16.44	16.68	16.68	-	-
Eye diameter(ED)	5.51	10.96	11.02	13.04	11.76	1.3
D	VIII+10	VIII+10	VIII+10	XI+10	XI+10	XII+10
A	III+9	III+9	III+9	III+9	III+9	III+10
V	-	I+5	I+5	I+5	I+5	I+5
P	-	12	12	12	12	12
Lateral line	-	22	21	21	-	21
Weight (g.)	-	-	-	-	317	400

\*shows measurements in cm.

Characteristic morphological properties are presented with a sexual dichromatism which is presented with the male showing a grey-brown coloration while the female is generally reddish with a large grey spot on the rear

part of the head and a yellow spot on the upper part of the caudal peduncle (Tortonese, 1971 in De Girolamo et al., 1999). It has a fused, beak-like jaw scraping algae and sea grass from the substrate (Guidetti & Boero, 2002). Due to its

grazing, the parrotfish seems to be a more competitive to *Treptachanta ballesterosii* than the other native herbivorous

species *Sarpa salpa* in Mediterranean Sea (Marletta & Lombardo, 2020).



**Figure 1.** A male *Spariosoma cretense* specimen (28.50 cm TL) captured in Dikili Bay, the northern Aegean Sea (Original photo by Kanat).

One mature specimen was 28.50 cm in total length. According to De Girolamo et al. (1999), we included the specimen into adults (estimated total length (TL)  $\geq 12$  cm). The morphometric measurements and meristic counts which were given in Table 1 were similar with the previous literature by Kampouris & Batjakas (2018), except for those given by Abeces et al., (2008) and Yapıcı et al., (2016).

Guidetti & Boero (2002) mentioned that the species which is relatively rare there, could establish and constitute populations successfully other than its typical distribution. Global heating of seas is an important factor that leads the reconstruction of the Mediterranean marine biodiversity (Bianchi & Morri, 2004; Lejeune et al., 2010).

Global change is having an ever increasing influence on the abundance and distribution of living organisms worldwide (Parmesan, 2003). As for the Mediterranean Sea, recently, the increasing of sea water temperature causes the shift and northward migration of many invertebrate and vertebrate taxa that are now living their natural biogeographical ranges. Therefore, some species, typically known as thermophilic are successfully colonizing in the north. The marine biodiversity of the Mediterranean is undergoing changes which can be characterized as a process towards tropicalization and the increasing of warm-water biota (Bianchi & Morri, 2003). A number of native species with tropical or subtropical affinity seem to have already moved towards the northern and colder sectors of the Mediterranean (Azzurro, 2008; Ben Rais Lasram & Mouillot, 2009). As the water temperature increases, the species such as *S. cretense*

which exists naturally in the southern Mediterranean Sea spreads northward from the native warm water ecosystem. This phenomenon has been termed as “meridionalisation” (Azzurro, 2008, 2011; Boero et al., 2008, Marletta & Lombardo, 2020).

In the light of this view, it can be thought that the native thermophilic species appearing northern than the typically geographic distribution range could serve as a clear indicator by providing the first sign of changes in seawater temperature (Azzurro, 2008).

The northward spreading of this Mediterranean parrotfish is not a single event and an ongoing process. Thus, monitoring of distribution of thermophilic indicator species, such as the parrotfish may also start to occur supporting the hypothesis that fish migrations may be related with climatic change, namely water warming and give some information to show possible changes on the Mediterranean marine ecosystems and to form stable populations outside its own region.

As a conclusion, the occurrence of *S. cretense* at Dikili Bay confirms an additional knowledge on its presence in the northern Aegean Sea of Turkey. As recognizing its growth, spawning and recruitment (Albouy et al., 2014; Marras et al., 2015) in benthic biodiversity (Lewis & Wainwright, 1985) and there is a little knowledge about the species biology and ecology, thus, further studies are required to track the population dynamics of this northward expanding species through the northern sectors of the Mediterranean basin. Although *S. cretense* which is not a commercial species in general (Fisher et al., 1987) and included as Least Concern in The IUCN Red List of Threatened Species (Pollard et al., 2012), this species is

highly valuable for both local recreational and commercial fisheries in Canary Islands (Bortone et al., 1991). It is also important for diversity of Dikili Bay ichthyofauna.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Ethical approval:** All applicable international, national, and/or institutional guidelines for the care and use of animals were followed.

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