

# ANNALES



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## BELONE BELONE (LINNAEUS, 1760) AND SPICARA SMARIS (LINNAEUS, 1758) ENTANGLED IN PLASTIC COLLARS IN THE DARDANELLES STRAIT, TURKEY

Sezginer TUNÇER

Çanakkale Onsekiz Mart University, Faculty of Marine Sciences and Technology, Terzioğlu Campus, 17100 Çanakkale, Turkey

Sedat GÜNDÖĞDU &amp; Cem ÇEVİK

Faculty of Fisheries, Department of Basic Sciences, Cukurova University, 01330, Balcalı Adana, Turkey

Aytuğ ZİLİFLİ

Graduate School of Natural and Applied Sciences, Çanakkale Onsekiz Mart University, Çanakkale, Turkey  
e-mail: aytugzili@stu.comu.edu.tr

### ABSTRACT

*One of the main causes of injury and mortality in marine life is entanglement in plastic litter. Marine plastic waste can affect marine organisms in several ways: causing serious injury or death (resulting from entanglement in or ingestion of plastic items), enabling chemical and microbial transfer (by acting as a vector for the transport of biota), and producing changes in species communities. In this study, two adult individuals from the Spicara smaris and Belone belone species caught in pelagic longlines at the Dardanelles Strait were found with plastic collars around their operculum and trunk, respectively. The plastic waste items were identified as security rings of plastic bottle caps. Both species displayed several degrees of injury. After removing the gastrointestinal tract of B. belone, a plastic filament was also found. This study shows that the impact of plastic debris on marine life is worsening.*

**Key words:** *Belone belone, Spicara smaris, plastic collar, Dardanelles strait, plastic pollution*

## BELONE BELONE (LINNAEUS, 1760) E SPICARA SMARIS (LINNAEUS, 1758) INTRAPPOLATI IN COLLARI DI PLASTICA NELLO STRETTO DEI DARDANELLI, TURCHIA

### SINTESI

*Una delle principali cause di lesioni e mortalità nell'ambiente marino è l'intrappolamento nei rifiuti di plastica. Tali rifiuti marini possono nuocere agli organismi marini in diversi modi: causando lesioni e morte (derivanti dall'intrappolamento o dall'ingestione di oggetti in plastica), consentendo il trasferimento di sostanze chimiche e microbiche (agendo da vettore per il trasporto) e producendo cambiamenti nelle comunità. In questo studio sono stati trovati due individui adulti di Spicara smaris e Belone belone catturati in palangari pelagici nello Stretto dei Dardanelli, con colletti di plastica attorno al loro opercolo e tronco. I rifiuti di plastica sono stati identificati come anelli di sicurezza di tappi di bottiglie di plastica. Entrambe le specie hanno mostrato diversi gradi di lesione. Nel tratto gastrointestinale di B. belone è stato trovato anche un filamento di plastica. Questo lavoro indica che l'impatto dei rifiuti di plastica sulla vita marina sta peggiorando.*

**Parole chiave:** *Belone belone, Spicara smaris, collare di plastica, stretto dei Dardanelli, inquinamento da plastica*

## INTRODUCTION

Marine plastic pollution has become an epic issue for marine environment. The most recent estimates show that 275 million tons (MT) of plastic garbage were generated worldwide in 2010, with 4.8 to 12.7 MT dumped into marine environments (Jambeck et al., 2015). As a result, over 250,000 tons of plastics are floating in the sea (Eriksen et al., 2014; Jambeck et al., 2015). The intensive presence of plastic litter in marine environment poses serious risks to marine life: entanglement, ingestion and colonization (Amaral-Zettler et al., 2015; Fazey and Ryan, 2016; Gündogdu et al., 2017; Votier et al., 2011). Entanglement in plastic rubbish is one of the major causes of injury and mortality in a wide range of marine life (marine mammals, fish, birds and reptiles) (Gregory, 2009; Ryan et al., 2009; Schrey and Vauk, 1987; Votier et al., 2011). According to Litterbase, a compilation of data based on scientific publications, entanglement is the third most frequent type of interaction with litter (23.88%) for marine life (Tekman et al., 2019).

Marine plastic pollution affects marine biota and ecosystems at many different levels. The impact of plastics on marine life is in parallel with the level of plastic pollution in the marine environment. Due to its semi-enclosed nature and intense coastal pressures, the Mediterranean Sea is under heavy impact from plastic contamination. It is estimated that between 1000-3000 tons of plastic litter is floating in the surface waters of the Mediterranean (Cozar et al., 2015; Bray et al., 2019).

Many researchers have stated that the Mediterranean Sea is an important plastic accumulation area and can be considered as the sixth garbage patch (Lebreton et al., 2012; Cozar et al., 2015; Suaria et al., 2016). According to many researchers, the Mediterranean coasts of Turkey are among the most plastic-polluted coasts (Gündogdu, 2017; Liubartseva et al., 2018; Tunçer et al., 2018). Consequently, the high level of plastic pollution poses important risks for the local marine life. Some of the previous studies have reported the various kinds of impact of plastics (ingestion, entanglement, colonization and habitat occupation) on marine life in the Mediterranean coasts of Turkey (Ayaz et al., 2006; Tonay et al., 2007; Triessnig et al., 2012; Gündogdu et al., 2017; Güven et al., 2017; Acar & Ates, 2018; Gündogdu et al., 2019).

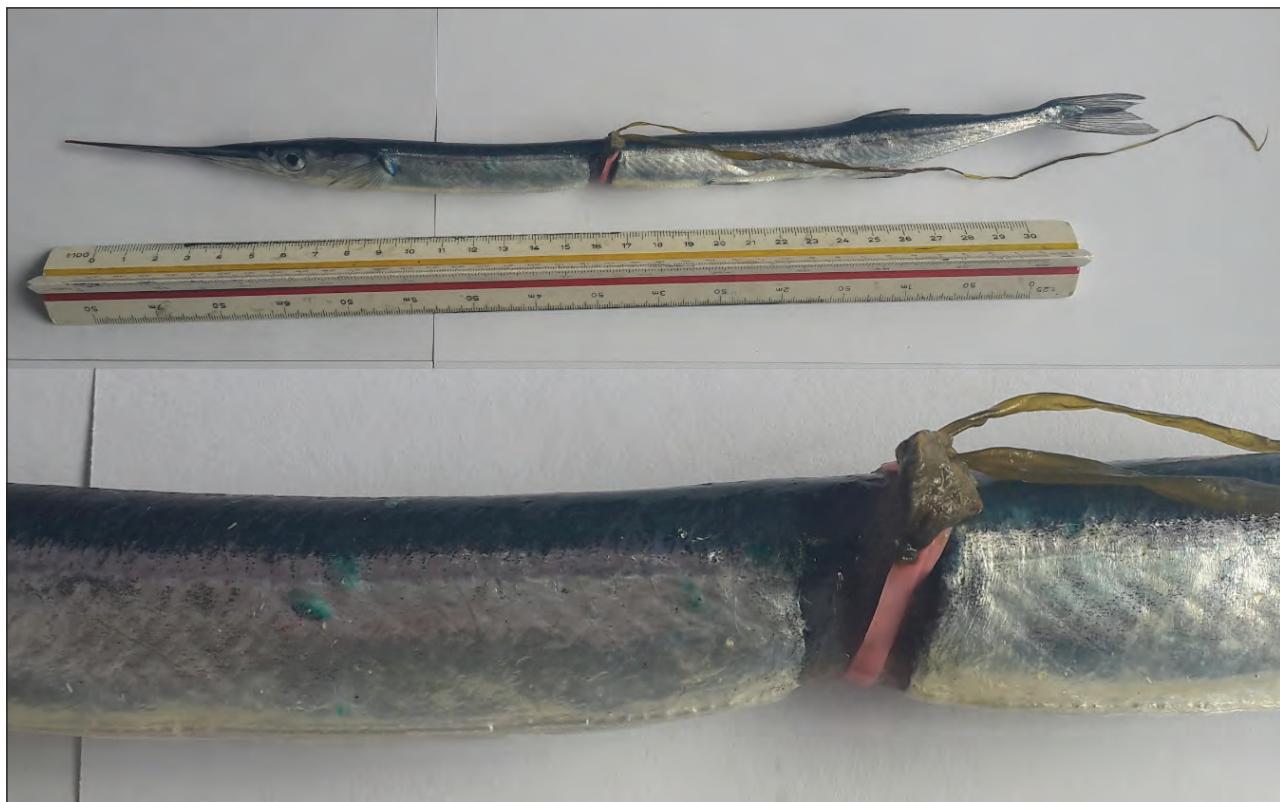
We report herein on plastic debris collars attached to two adult fish specimens (*Belone belone* (Linnaeus, 1760) and *Spicara smaris* (Linnaeus, 1758)) in the Dardanelles Strait and comment on their incidence and damage to the fish.

## MATERIALS AND METHODS

Two adult specimens of *S. smaris* and *B. belone* were caught in longlines in the Çardak Lagoon and Kumkale, locations situated at the Dardanelles Strait (Fig. 1). *B. belone* was caught on 11 April 2019 by local fishermen (commercial) operating in Cardak/Lapseki. *S. smaris* was caught by a small-scale fisherman in the Kumkale region on 20 April 2019.



**Fig. 1: Sampling locations, where the two species were caught.**  
Sl. 1: Zemljevid obravnavanega območja, kjer sta bila ujeta primerka obeh vrst.



**Fig. 2: The *Belone belone* specimen from the Dardanelles Strait, Cardak Lagoon, still with the plastic collar covered in *Chorda filum*.**

**Sl. 2: Primerek iglice iz dardanske ožine (Cardak Lagoon) s plastičnim ovojem.**

The Çardak Lagoon is located on the northeastern coast of the Dardanelles Strait. The sand spit on the coast of this settlement is 4.3 km long and comprises an area of 3.5 square kilometres. The average depth is 2 m. Due to its location (close to a local port, one of the mixing points of Mediterranean water with the Marmara Sea), the Çardak Lagoon is a potential accumulation area for marine debris. Kumkale is relatively more remote from human activity than Çardak.

Before the investigation, the length and weight parameters were recorded. The collars were photographed and measured by ImageJ software. Stomach content analyses were conducted for both species. The stomachs and intestines were excised, and their respective contents separately placed inside a pre-cleaned glass petri dish. Microplastic particles, if any, were visually counted.

## RESULTS AND DISCUSSION

It was determined that the first specimen (*B. belone*), caught by longlines in the Cardak Lagoon, close to the Sea of Marmara, was a female, measuring 34.3 cm in total length (TL) and 278 g in total weight (TW), and the second specimen (*S. smaris*), caught by longlines in

Kumkale, a location close to the Aegean Sea, was a male with 24.9 cm TL and 439 g TW.

The specimens were found with plastic debris collars around their gills and trunk, respectively (Figs. 2 and 3). The collars were identified as the detachable parts of plastic bottle caps. The plastic debris collar found on *B. belone* was covered by *Chorda filum* (Fig. 2). The length of *C. filum* was 8.90 cm. The internal diameters of the collars measured, respectively, 2.25 cm (*B. belone*) and 2.68 cm (*S. smaris*). Only *B. belone* had one plastic filament in its stomach (Fig. 4).

Plastic debris entanglements were previously reported by Sazima et al. (2002) for *Rhizoprionodon lalandii* (Müller & Henle, 1839), by Wegner & Cartamil (2012) for *Isurus oxyrinchus* Rafinesque (1810), and by Nunes et al. (2018) for several coral reef fishes. According to these studies, feeding behaviours and other behavioural characteristics, such as neophilia, are likely to make these species vulnerable to entanglement in plastic collars. The two species reported herein are commonly found in the Dardanelles Strait. *S. smaris* inhabits *Posidonia* beds and muddy bottoms and mostly feeds on zooplankton (Karachle and Stergiou, 2014). *B. belone* lives close to the surface and feeds mostly on small fish



**Fig. 3: The specimen of *S. smaris* from Kumkale, Dardanelles Strait, with the plastic collar.**  
**Sl. 3: Primerek girice iz Kumkale v dardanski ožini s plastičnim ovojem.**



**Fig. 4: Plastic filament found in the stomach of *B. belone*.**  
**Sl. 4: Plastični filament iz želodca iglice.**

(Dorman, 1991). Thus, their feeding behaviour may be a factor in this entanglement.

The occurrence of plastic collars in marine environment is possibly related to in situ littering activities and poor waste management system. In fact, landfilling is the main waste management practice in Turkey. This increases the wind and/or stormwater runoff transportation levels of such litter from land to marine environment. Especially disposable plastic waste ends up in the sea and may cause serious harm to marine life, as established and demonstrated in this study.

The increasing occurrence of plastics in the marine environment poses significant risks to marine life (Barreto et al., 2019). Particularly the plastic debris that might cause entanglements among marine fauna increases the significance of this risk. Our results indicate that plastic waste, such as collars and rings, may cause severe tissue damage and breathing difficulties in fish.

# *IGLICA, BELONE BELONE* (LINNAEUS, 1760), IN GIRICA, *SPICARA SMARIS* (LINNAEUS, 1758), ZAPLETENI V PLASTIČNI OVOJ V OŽINI DARDANELE, TURČIJA

*Sezginer TUNÇER*

Çanakkale Onsekiz Mart University, Faculty of Marine Sciences and Technology, Terzioğlu Campus, 17100 Çanakkale, Turkey

*Sedat GÜNDÖĞDU & Cem ÇEVİK*

Faculty of Fisheries, Department of Basic Sciences, Cukurova University, 01330, Balcalı Adana, Turkey

*Aytuğ ZILİFLİ*

Graduate School of Natural and Applied Sciences, Çanakkale Onsekiz Mart University, Çanakkale, Turkey  
e-mail: aytugzilifli@stu.comu.edu.tr

## POVZETEK

Eden izmed glavnih virov poškodb in smrtnosti v morskem okolju je zapletanje v plastične odpadke. Plastični odpadki v morju lahko morskim organizmom povzročajo težave na več načinov; povzročajo poškodbe ali smrt (zaradi zapletanja v mrežo ali zaužitja plastičnih delov), omogočajo kemične in mikrofone prenose (kot prenašalec v živem svetu), in povzročajo spremembe v združbah vrst. Avtorji v pričajoči študiji poročajo o dveh odraslih primerkih girice (*Spicara smaris*) in iglice (*Belone belone*), ujetih s parangalom v ožini Dardanel, ki so se pri prvi vrsti zapletle v plastični ovoj okoli škržnega poklopca, v drugem pa okoli trupa. Plastični ovoj je bil v obeh primerih varnostni obroč plastenek. Pri obeh primerih so bile vidne poškodbe. V prebavnem traktu iglice je bil najden plastični filament. Sodeč po izsledkih te študije se vpliv plastičnih odpadkov na morski živelj stopnjuje.

**Ključne besede:** *Belone belone*, *Spicara smaris*, plastični ovoj, Dardanele, onesnaževanje s plastiko

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