NOTES AND NEWS

ADDITIONAL RECORDS OF CALAPPA GRANULATA (LINNAEUS, 1758) (BRACHYURA, CALAPPIDAE) IN THE NORTHERN ADRIATIC SEA

BY

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INTRODUCTION

The shamefaced crab Calappa granulata (Linnaeus, 1758) (Brachyura, Calappidae) is a sublittoral species considered rare in the Adriatic Sea and, until recently, recorded only in its middle and southern parts (see Pesta, 1918; Manning & Števčić, 1982; Števčić, 1990; d’Udekem d’Acoz, 1999; Ungaro et al., 2005; Müller & Schubart, 2007; Marković et al., 2017). In 2010, this species has been recorded for the first time off the western coast of the Istria peninsula (Croatian coast), an area substantially further north than that of previous records in the Adriatic Sea (Dulčić & Tutman, 2012). In 2017, six additional specimens were caught by local fishermen in the same area. These findings were brought to light through the Local Ecological Knowledge (LEK) survey (Bender et al., 2014), which was undertaken in the area of the Istria peninsula and was aimed at local professional fishermen operating in the area.

The aim of this paper is to present additional records of C. granulata from the northern Adriatic Sea, indicating an extension of the known distribution of this species to the northernmost part of the Mediterranean Sea. Additionally, we give support to the use of LEK surveys in tracking biodiversity changes, and this issue is discussed herein.

MATERIAL AND METHODS

On 15 July 2017 three specimens of Calappa granulata were caught at 5 Nm [approx. 9 km] off Savudrija (Istria, Croatia, northern Adriatic) (45°30′10″N 13°29′05″E) by trawl net at about 25 m depth on a sandy-muddy bottom. Additionally, two specimens were caught 3 Nm [approx. 5.4 km] off Poreč (Istria, Croatia,

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northern Adriatic) (45°13′43″N 13°27′22″E) by trammel net (mesh size 40 mm) at 20 m depth on a sandy-muddy bottom on 1 September 2017. Finally, one specimen was caught 3 Nm off Vrsar (Istria, Croatia, northern Adriatic) (45°08′43″N 13°33′43″E) at 20 m depth on a sandy-muddy bottom on 15 September 2017. All specimens were identified following Holthuis (1987). Besides measurements of carapace width (CW) and length (CL) (CW, maximal distance between the posterior anterolateral spines; CL, distance between the centre of the anterior interorbital margin and the centre of the posterior margin), also the sex was determined for all specimens.

Two specimens from the Poreč area are preserved in the collection at the Institute of Oceanography and Fisheries, Split (Catalogue numbers: IOR-CrusCg 2017/1 and IOR-CrusCg 2017/2) while the rest of the specimens were kept by the fishermen upon analysis.

RESULTS AND REMARKS

**Calappa granulata** (Linnaeus, 1758) (fig. 1)

Material examined.— Savudrija (Istria, Croatia, northern Adriatic): 3 specimens, CL = 7.6 cm, CW = 9.9 cm; CL = 7.4 cm, CW = 9.8 cm; CL = 7.5 cm, CW = 9.7 cm; Poreč (Istria, Croatia, northern Adriatic): 2 specimens (fig. 1), CL = 7.8 cm, CW = 10.5 cm; CL = 7.8 cm, CW = 10.2 cm; Vrsar (Istria, Croatia, northern Adriatic): 1 specimen, CL = 8.0 cm, CW = 10.2 cm. All individuals were adult males.

![Two specimens of Calappa granulata](https://example.com/calappa-granulata-specimens.jpg)

Fig. 1. *Calappa granulata* (Linnaeus, 1758). Two specimens (♂♂) in dorsal view (CL = 7.8 cm, CW = 10.5 cm; CL = 7.8 cm, CW = 10.2 cm) caught in the northern Adriatic Sea (3 Nm [ca. 5.4 km] off Poreč, Istria peninsula, Croatia, northern Adriatic; 45°13′43″N 13°27′22″E) by trammel net on 1 September 2017.
In the last decades, a significant amount of information related to biodiversity changes in the Adriatic Sea has emerged as a result of activities other than conventional scientific samplings and surveys, e.g., through citizen reports, data obtained from social media, online surveys, etc. One of the recently implemented tools in the investigations of biodiversity changes is the survey of “Local Ecological Knowledge” (Bender et al., 2014) also known as LEK. Having learned from previous findings (Dulčić & Tutman, 2012), we approached professional artisanal fishermen from the western coast of the Istria peninsula and acquired information on their perception of recent fishery and biodiversity changes in the area. When asked about their potential observations of new species in the area, 7 fishermen (out of a total of 12) reported the occurrence of an odd-looking crab with orange coloured dots on the upper side and a robust appearance. They were able to identify it as *C. granulata* on the basis of shown photographs and 3 fishermen managed to provide the individuals presented herein. Besides reporting new records, fishermen also noted the absence of this species in the past and its gradual appearance in catches in recent years.

In spite of these additional records of *C. granulata* from the northern Adriatic Sea, it is too early to express any reliable comment whether or not this species already established a breeding population in the area. In addition, all individuals presented herein, as well as those reported by Dulčić & Tutman (2012) and Bettoso et al. (2018) were males, indicating an unusually asymmetrical sex ratio. Besides noting the presence of *C. granulata*, the majority of fishermen also indicated an increased presence of another previously rarely caught crab, *Dromia personata* (Linnaeus, 1758). There are a couple of possible explanations for these new occurrences of the aforementioned crabs.

The presence of *C. granulata* could be the result of passive transport of larvae from southern areas and subsequent establishment in the northern regions. This transport and establishment could be additionally facilitated by the effect of BiOS (Bimodal Oscillating System), which affects the decadal variability of the thermohaline circulation in the Adriatic (Civitarese et al., 2010). In recent years, a trend of northward spreading of various species of higher thermal preferences has been observed in the Adriatic Sea. Besides geographical spreading, abundance increases were documented for certain species (see Dragičević et al., 2017). This crab species shows a preference for subtropical and tropical waters (Spanò et al., 2004) and its northward spreading could be a result of the general sea warming trend observed in the Mediterranean Sea (Bianchi et al., 2012). In addition, a significant decline of large demersal fishes, especially elasmobranchs, in the northern Adriatic (Giani et al., 2005; Barausse et al., 2014) may have allowed potential prey species to flourish.
Also, impacts of commercial fishing (particularly bottom trawling) are considerably shifting the benthic community structure in the northern Adriatic (Bastari et al., 2017). This has also an influence on the use of such resources. For example, the shrimp *Parapeneaus longirostris* (Lucas, 1846) became an important fisheries resource, while the abundance of the traditional Norway lobster stock, *Nephropsnorvegicus* (Linnaeus, 1758), decreased dramatically, partly due to a long-lasting over-fishing (Froglia, 2017). *C. granulata* might become a stable element in the northern Adriatic fauna and even a potential resource for local fisheries, although at the present time this species is not considered an economically important species, even in those areas of the Adriatic where it is more frequent. Nevertheless, additional research carried out through a combination of scientific surveys, fishery monitoring programmes, and the use of LEK surveys, should shed more light on the status and distribution of the *C. granulata* population in the Adriatic Sea.

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REFERENCES


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