

THE NEED OF CARTOGRAPHY FOR CORALLIGENOUS AND RHODOLITHS BEDS ALONG THE MEDITERRANEAN SEA: THE BALEARIC ISLANDS CASE

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ABSTRACT

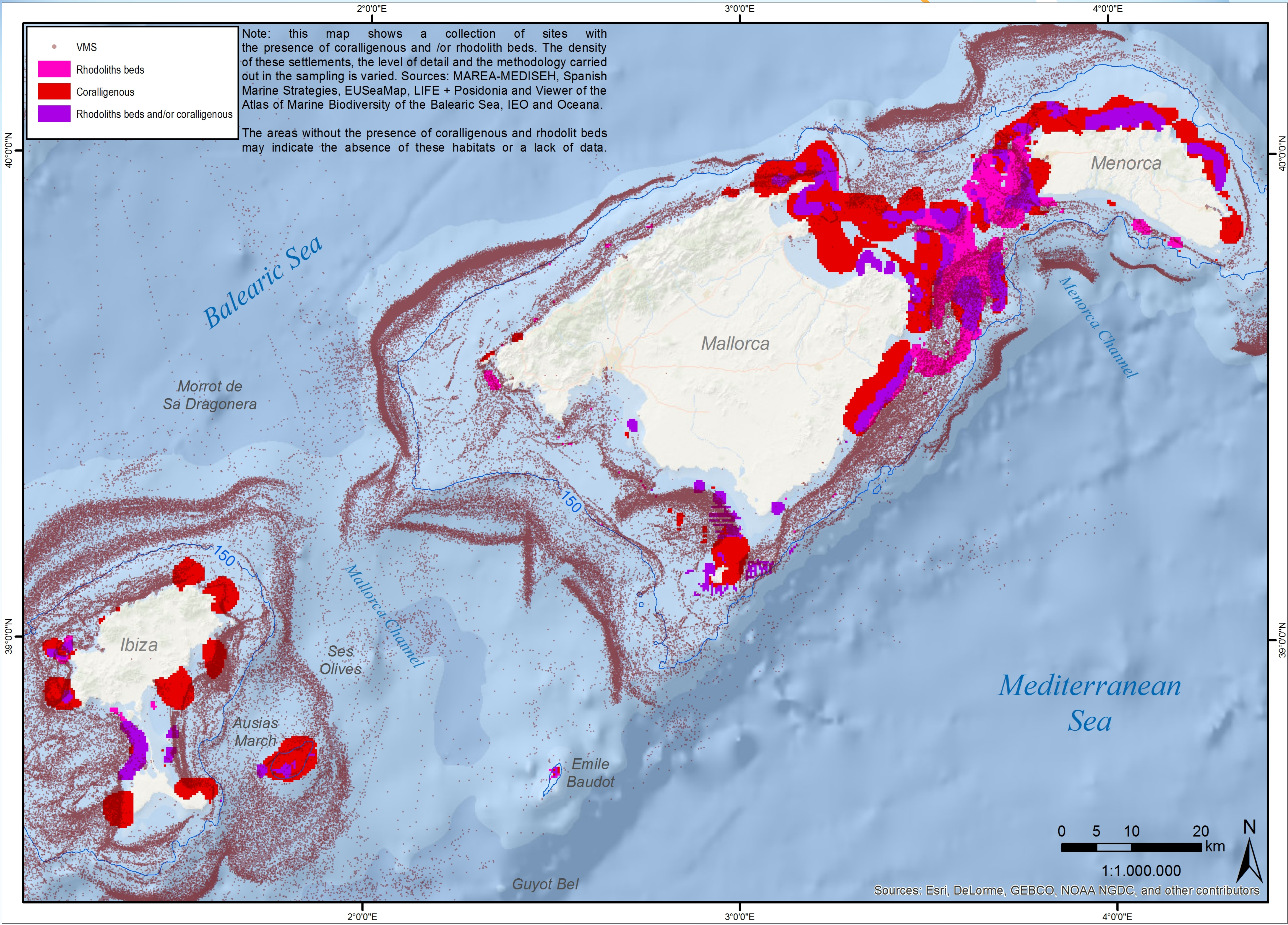
Coralligenous and rhodoliths beds are two types of biogenic habitats, structured by calcareous red algae. Widely distributed along the Mediterranean Sea, these formations create complex three-dimensional structures, where countless marine species -including those of high commercial value and endangered ones- feed, rest and nest. These characteristics confer the two habitats a great ecological and economic importance, which has motivated their protection under the European Union legislation and the development of an explicit action plan within the framework of the Barcelona Convention. During the past decades, dozens of scientific campaigns at sea have contributed to their knowledge, location and description, resulting in a substantial amount of available data about coralligenous and rhodoliths beds. The cartography of marine habitats is a necessary tool to apply certain specific conservation measures, like the closure to bottom trawling of the areas where these habitats are present (Regulation 1967/2006). Thus, the presence, characteristics and importance of these habitats are especially well known in the bottoms surrounding the Balearic Islands (Western Mediterranean). A complete cartography was developed for these habitats in the Balearic area, coupling the best available scientific data (e.g. data published by the Spanish Oceanographic Institute) with the data compiled during Oceana expeditions carried out between 2006 and 2013.

KEY-WORDS

Cartography, rhodoliths beds, coralligenous, Mediterranean Sea, Balearic Islands, bottom trawling



1) Juvenile individuals of commercial species on rhodoliths beds in the Balearic Islands bottoms (*Scorpaena scrofa*, *Palinurus elephas*, *Lophius piscatorius* and *Scorpaena notata*). 2) Invertebrates as bryozoans, sponges, gorgonians and ascidians on coralligenous reefs (*Adeonella calveti*, *Hexadella racovitzae*, *Paramuricea clavata* and *Eunicella verrucosa*). 3) Marks done by trawl activity on rhodoliths beds, filmed by Oceana in the Balearic Islands bottoms.



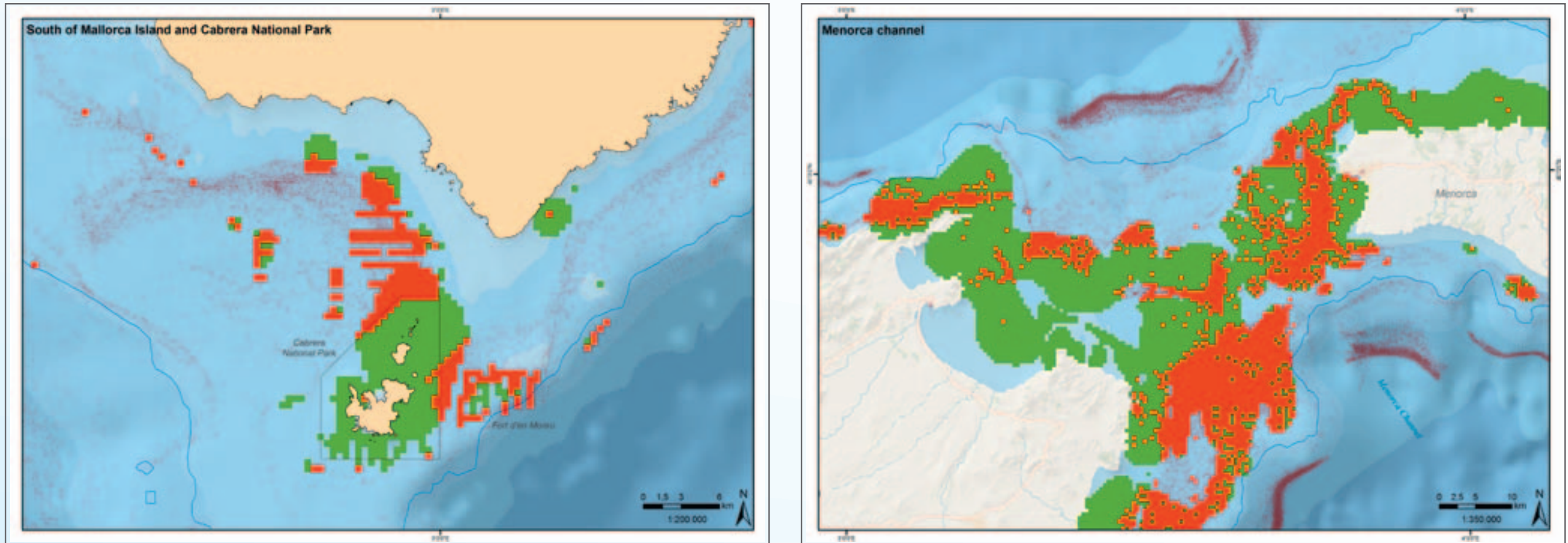
INTRODUCTION

The coralligenous and rhodoliths beds are sensitive habitats ecologically and economically relevant, important for many marine species (Ballesteros, 2006). Thus, they are protected under EU fisheries and environmental legislation (Council Regulation EC 1967/2006 and Council Directive 92/43/EEC) and the Barcelona Convention has contemplated them in its Reference List of Habitat Types to be protected in addition to the specific Plan of Action for these habitats.

Marine habitats mapping is a priority tool (Gibson et al., 2007; Brown et al., 2011) that allows combining the habitats' distribution with the threats the area holds. This facilitates the sustainable use of resources, their long-term conservation and the effective compliance with the current legislation. The Balearic Islands are a clear example of how the mapping of marine habitats is necessary to halt protected habitats' degradation, as the area is currently affected by illegal trawling activities.

MATERIALS AND METHODS

An extensive and thorough review of campaign reports, scientific papers and other literature was carried out looking for information on coralligenous and rhodoliths beds in the Balearic continental shelf. The standardization of the information was done so it could be displayed on a single map since the obtained data was transposed to 500 m grid cells. The -150 m bathymetric contour was pointed as the limit distribution of coralligenous and rhodoliths beds. Data on the bottom-trawling fleet's Vessel Monitoring System (VMS) for the years 2008-2011 was superimposed to the final map.



Detail of two areas with presence of trawled coralligenous and rhodoliths beds (in red) and not trawled coralligenous and rhodoliths beds (in green).

RESULTS

The resulting mapping with all the relevant data on the presence of coralligenous and rhodoliths beds included: 5 at-sea Oceana campaigns with 148 dives above -150 m with ROV and divers, conducted during the years 2006, 2007, 2008, 2010 and 2013; several at-sea campaigns conducted by the Spanish Institute of Oceanography (IEO) between 2004 and 2012, under the MIGJORN, BALAR, PESCALA, CANAL and MEDITS projects; and other sources (MAREA-MEDISEH, Spanish Government Marine Strategies and Ecocartographic Coastal Studies, EUSeaMap, LIFE + Posidonia and the Atlas of Marine Biodiversity in the Balearic Sea). The protected habitats have been demarcated, noting those directly impacted by bottom trawling. According to the data shown in this mapping, we found that bottoms with coralligenous and rhodoliths beds (4,266 km²) are present in a 24.51% of the Balearic continental shelf and a 12.82% of the Balearic promontory bottoms. When comparing with the VMS data, we found that a 36.97% of the coralligenous and rhodoliths beds (1,577 km²) were directly affected by bottom trawling between 2008 and 2011 in the Balearic Islands.

DISCUSSION AND CONCLUSIONS

Almost a 25% of the Balearic continental shelf is covered by coralligenous and rhodoliths beds, evidencing the relevance of these habitats in the area, and meaning that effective management measures are needed to ensure their conservation and protection. Pursuant to Regulation (EC) 1967/2006, and as a result of this work, we found that at least 9.1% of the Balearic continental shelf has undergone illegal trawling. It is thus possible now to establish management measures -previously limited by the lack of mapping information- such as the banning of bottom trawling on the areas with known presence of coralligenous and rhodoliths beds, and the reinforcement of EU legislation, especially on the areas where the illegal activity has been detected. Thanks to the mapping, a buffer zone that softens the indirect impacts of fishing, such as turbidity and the sedimentation resulting from the materials lifted from trawled bottoms, is feasible. Oceana's recommendation is to establish a buffer zone among the protected habitats and, at least, the -200 m bathymetric contour, as a precautionary measure to avoid bottom trawling's direct and indirect effects on these habitats. This mapping should be updated with the most recent VMS data available (in this case from 2012 and 2013) and be completed with all the known locations of coralligenous and rhodoliths beds that may not have been covered here. Finally, it would be necessary to expand the current knowledge to areas of the Balearic continental shelf that have not yet been studied, in order to develop a comprehensive mapping of the Balearic Islands' marine habitats and thus proceed to their best possible management.

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