

DISTRIBUTION OF DEEP-SEA LAMINARIANS AROUND THREE SPANISH MARINE PROTECTED AREAS

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Abstract

Most marine protected areas (MPAs) have been declared marine extensions of protected terrestrial ecosystems. Therefore, these protected sites are around or beside coastal or island marine reserves, natural parks, etc. That means that most of the protected seabeds are normally shallow coastal areas usually no deeper than the infralittoral zone. Deep-sea laminarians extend down to circalittoral seabeds that are not always included inside protected areas. We are presenting data on deep-sea laminarians' distribution in places surrounding three marine protected areas in Spain (Columbretes Islands Marine Reserve, Alboran Island Marine Reserve and Cabrera Archipelago National Park) that lie outside the protected zone because they are on deeper floors. Therefore, they remain unprotected.

Key words: *Laminaria rodriguezii*, *Phyllariopsis*, deep-sea, Mediterranean Sea, vulnerable marine vegetation.



Phyllariopsis spp. and *L. rodriguezii* found around Columbretes Islands Marine Reserve.

Introduction

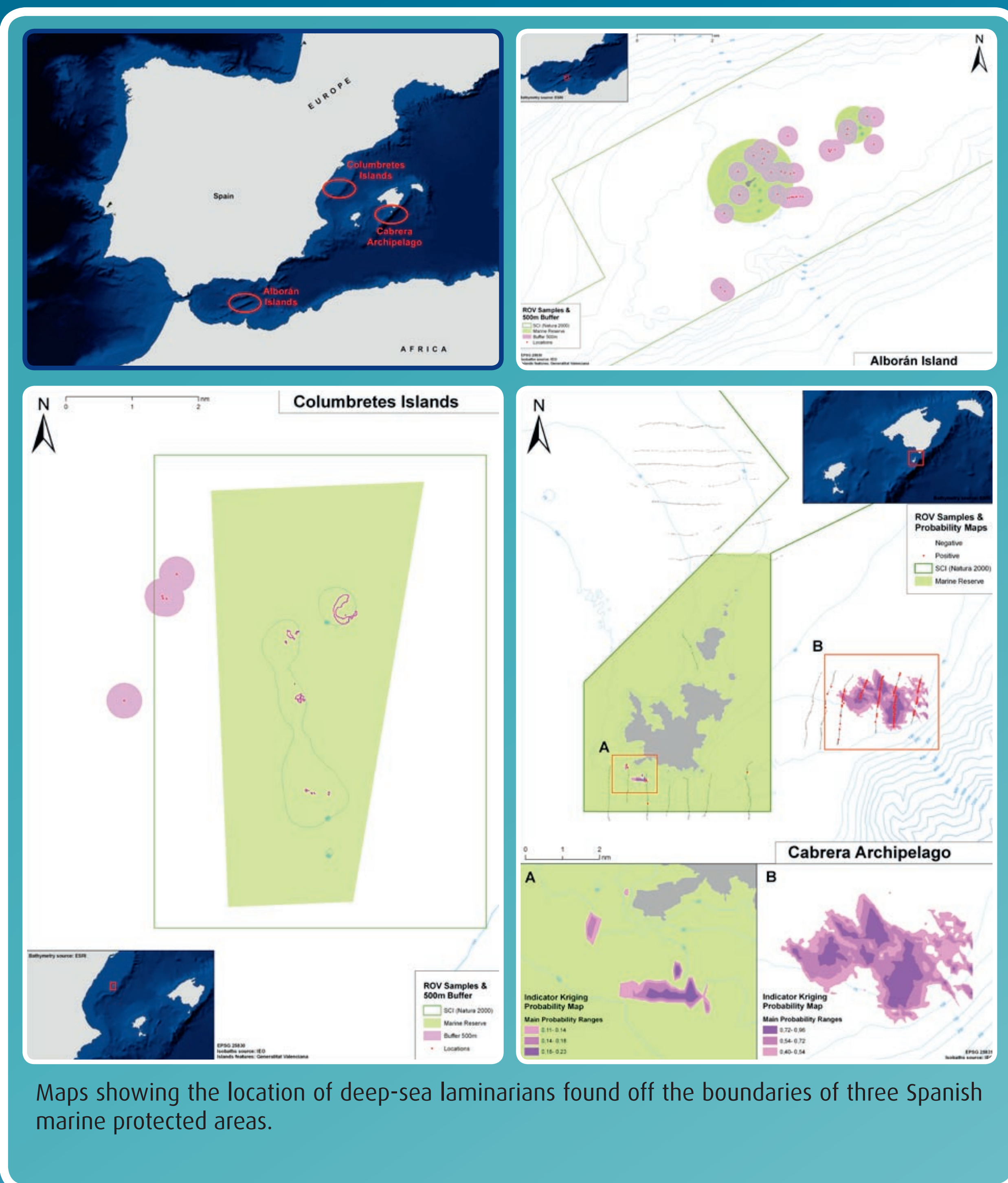
Laminarian species like *Laminaria rodriguezii* Borner, *Phyllariopsis purpurascens* (C. Agardh) Henry & South and *Phyllariopsis brevipes* (C. Agardh) Henry & South, can reach deep beds: more than -25 m for *P. purpurascens* (Flores-Moya, 1997), and even deeper for *P. brevipes* (Ballesteros, 1984; Henry, 1987; González-García & Conde, 1993). *L. rodriguezii* distribution has been normally accepted down to -50/-120 m. (Giaccone, 1967), although new publications extend the species' range to -200 m deep (Boero *et al.*, 2008). *L. rodriguezii* and *P. purpurascens* are species considered as threatened species in the Mediterranean Sea (PNUE, 1990). *L. rodriguezii* is a species also protected by 1976 Barcelona and 1979 Bern Conventions. In presenting this information, we are attempting to show that current MPAs do not take into account a deeper distribution of vulnerable marine vegetation, and we are promoting the enlargement of those areas to include a wider variety of habitats and algal species.

Materials and methods

Through the use of a remotely operated vehicle (ROV), deepwater zones inside and outside of three Spanish MPAs were inspected: Columbretes Islands and Alboran Island Marine Reserves, where the transects did not follow a sample-taking pattern, and Cabrera Archipelago National Park, where a grid of transects was pre-designed, thus covering an area of approximately 8,000 Ha. The transects were made between depths of -20 and -200 m, traversing distances between 300 and 3,000 m in length at speeds between 0.2 and 0.4 knots and maintaining a field of vision between 1.5 and 2 m wide.



Phyllariopsis spp. and *L. rodriguezii* found around Cabrera Archipelago National Park.



Phyllariopsis sp., *L. ochroleuca* and *S. polyschides* found around Alboran Island Marine Reserve.

Results

In total, 42 transects were made, covering a distance of 96,550 m and covering an area of 168,350 m²: 7 transects, 7,200 m traveled and 12,600 m² documented in the Columbretes area; 14 transects, 19,000 m traveled and 33,250 m² in the Alboran area and 21 transects, 70,350 m traveled and 122,500 m² documented in the Cabrera area. The species encountered in the Columbretes and Cabrera areas were chiefly *Phyllariopsis* spp. (-60/-70 m) and *L. rodriguezii* (-50/-75 m). In the case of Alboran, the species *Phyllariopsis* sp., *L. ochroleuca* Bachelot de la Pylaie and *Saccorhiza polyschides* (Lightfoot) Batters were found at depths greater than -50/-60 m as had already been previously observed by Templado *et al.* (2006). Both on the Columbretes and in the Cabrera areas, laminarians were found outside the seabeds of the protected areas, whereas on Alboran, they were found in and outside the protected area, given the laminarians' greater expanse in this zone and how quickly the nearby seabeds drop off. *Phyllariopsis* spp. usually appears more spread out. Some major concentrations can reach deep seabeds (-60/-70 m) off Alboran Island and to the west of the Columbretes area. *L. rodriguezii*, is specially abundant to the east of Cabrera, around -65 m, forming major colonies on the detritic sandy seabeds especially around large coralligenous concretions. *L. ochroleuca* and *S. polyschides* forests, in turn, are known on the Alboran Island seabeds, and they extend beyond the protected area in all directions.

Discussion and conclusions

As exhaustive samplings were not performed, it is very possible that the distribution and abundance of these species are greater both inside and outside these MPAs. However, the intention behind these samplings was not to make complete bionomic cartographies, but to learn about the benthic communities that extend beyond the protected areas. Since most MPAs have been declared around islands or coastal areas, the seabeds rarely go beyond the upper circalittoral zone, although there may be zones that even surpass -100 m. The lack of MPAs that accommodate more ample bathymetric ranges or, even, on the high seas, makes many deepwater laminarian and other algal communities remain largely outside the protected areas, in spite of their ecological importance, and being species included in several different catalogs and marine conservation conventions.

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