

SPATIAL DISTRIBUTION AND POPULATION STRUCTURE, OF THE THREATENED PEN SHELL *PINNA RUDIS*, LINNAEUS, 1758 IN A W MEDITERRANEAN MARINE PROTECTED AREA

Maite Vázquez-Luis ^{1*}, Elisabet Nebot ¹ and Salud Deudero ¹
¹ Instituto Español de Oceanografía (IEO) - maitevazquezluis@gmail.com

Abstract

Spatial distribution, sizes and densities of *Pinna rudis* have been studied in the Cabrera National Park. Densities varied spatially within the park (from low 0-0.16 to high 6.89 ind./100 m²) corresponding to a wide range of sizes. Most pen shells were patchily distributed and mainly concentrated in caves. High densities were observed in two hotspots, and represented the highest densities recorded worldwide, possibly linked to retention processes through high larval accumulation. The population size structure showed a unimodal distribution with individuals ranging from 6.2 to 25.0 cm shell width, with an average shell width of 16.0 ± 3.4 cm. Given the scarce data on this species, the present study provides valuable information for the spatial management and conservation of this threatened species.

Keywords: *Density, Bivalves, Mediterranean Sea*

Introduction

The bivalve *Pinna rudis*, Linnaeus 1758 is patchily and widely distributed in Mediterranean Sea and Atlantic Ocean. This species is included in Annex II of Bern Convention (as strictly protected species) and Barcelona Convention (as marine species endangered or threatened). Population of *P. rudis* is threatened by anthropogenic activities. MPAs can guarantee protection to this species. Knowledge on essential habitats and spatial distribution for this species is therefore fundamental to promote proper management strategies. The main objective was to assess the density of *P. rudis* individuals, distribution and size structure of the population in a MPA.

Materials and methods

The study was carried out at the marine protected area (MPA) of Cabrera National Park in the Balearic Islands (W Mediterranean), protected since 1991. A total of 418 strip transects were conducted by scuba diving in order to survey *P. rudis* density in all habitats at depths ranging from 4 to 40 meters depth. The field survey was carried out at the end of July 2011, 2012 and 2013. Data gathered were expressed in individuals per 100 m² and differences in density distribution among habitats were assessed applying a permutational test (based in a similarity matrix and Euclidian distance on untransformed data) of one-factor design, with habitat as fixed factor with 5 levels (caves, coastal detritic, rock, sand and seagrass).

Results and Discussion

A total of 88 living individuals and 25 dead individuals of *P. rudis* were recorded along 152,146.35 m² in a depth range from 4.7 to 34 m. In general, low densities of *P. rudis* were found in the MPA (mean density of 0.01–1.69 ind./100 m², Fig. 1).

Habitat type mainly determined its distribution being more abundant in caves with peaks of 6.89 ind./100 m² ($P = 0.001$, Fig. 2a). The population size structure showed a unimodal distribution with individuals ranging from 6.2 to 25 cm shell width, with an average shell width of 15.99 ± 3.39 cm (Fig. 2b). The MPA hosts a well-established population with individuals of all size ranges and the present study found the highest density recorded worldwide. Therefore, monitoring and further studies are highly recommended.

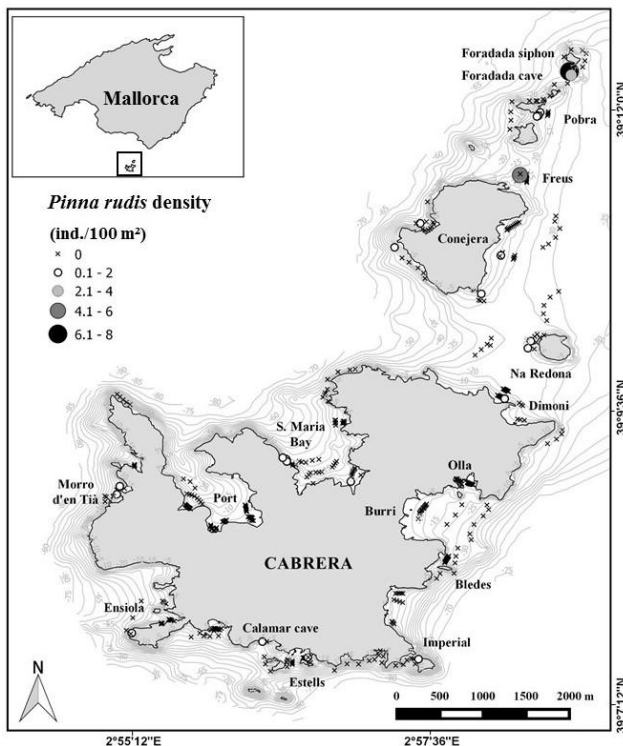


Fig. 1. Distribution and density of *Pinna rudis* individuals in Cabrera MPA.

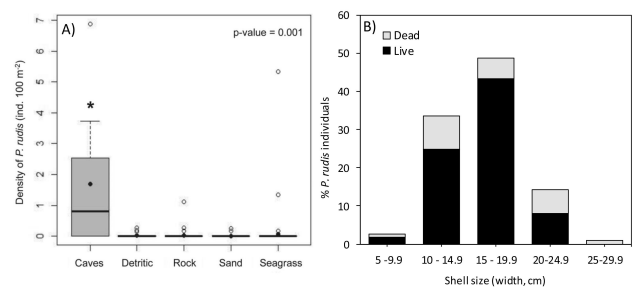


Fig. 2. A): Boxplot of values of *P. rudis* density (ind./100 m²) in the studied habitats; and B): shell size structure (N=88 living individuals and 25 dead individuals).

References

1 - Nebot E, Vázquez-Luis M, García-March J.R, Deudero S., 2016. Population Structure and Growth of the Threatened Pen Shell, *Pinna rudis* (Linnaeus, 1758) in a Western Mediterranean Marine Protected Area. *Mediterranean Marine Science*, in press