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Mikel Zabala, (2012).

[Multiple Processes Regulate Long-Term Population Dynamics of Sea Urchins on Mediterranean Rocky Reefs](#)

. PLoS ONE 7(5): e36901. doi:10.1371/journal.pone.0036901

Abstract: We annually monitored the abundance and size structure of herbivorous sea urchin populations (*Paracentrotus lividus* and *Arbacia lixula*) inside and outside a marine reserve in the Northwestern Mediterranean on two distinct habitats (boulders and vertical walls) over a period of 20 years, with the aim of analyzing changes at different temporal scales in relation to biotic and abiotic drivers.

P. lividus

exhibited significant variability in density over time on boulder bottoms but not on vertical walls, and temporal trends were not significantly different between the protection levels. Differences in densities were caused primarily by variance in recruitment, which was less pronounced inside the MPA and was correlated with adult density, indicating density-dependent recruitment under high predation pressure, as well as some positive feedback mechanisms that may facilitate higher urchin abundances despite higher predator abundance. Populations within the reserve were less variable in abundance and did not exhibit the hyper-abundances observed outside the reserve, suggesting that predation effects maybe more subtle than simply lowering the numbers of urchins in reserves.

A. lixula

densities were an order of magnitude lower than *P. lividus* densities and varied within sites and over time on boulder bottoms but did not differ between protection levels. In December 2008, an exceptionally violent storm reduced sea urchin densities drastically (by 50% to 80%) on boulder substrates, resulting in the lowest values observed over the entire study period, which remained at that level for at least two years (up to the present). Our results also showed great variability in the biological and physical processes acting at different temporal scales. This study highlights the need for appropriate temporal scales for studies to fully understand ecosystem functioning, the concepts of which are fundamental to successful conservation and management.

Keywords: seaurchins, mediterranean sea, medes islands, *Paracentrotus lividus*, *Arbacia lixula*, monitoring, dinamic populations