The role of Marine Protected Areas in influencing the invasion success of the alien crab *Percnon gibbesi*

Noe' Simona[1], Gianguzza Paola[1], Di Trapani Francesco[1], Badalamenti Fabio[2,3], Vizzini Salvatrice[1], Vega Fernández Tomás[2,3] and Bonaviri Chiara[1]

[1] Department of Earth and Marine Sciences, University of Palermo, Via Archirafi 18, 90123 Palermo, Italy
E-mail: simonoe86@gmail.com
[2] National Research Council (CNR) - Institute of Coastal Marine Environment (IAMC), Via G. Da Verrazzano 17, 91014 Castellammare del Golfo, Italy
[3] Integrated Marine Ecology Department, Stazione Zoologica Anton Dohrn, Villa Comunale, 80121 Napoli, Italy

The biotic resistance hypothesis states that pristine communities, with high species richness and functional diversity, are less prone to biological invasions than species-poor areas either this is natural or it is a result of human activities. Complex communities with high levels of biodiversity, such as those hosted by Marine Protected Areas, should offer fewer niche opportunities (e.g. resources and space) to invasive species thereby reducing both their establishment possibilities and success (i.e. settlement and/or expansion).

The present study aimed to evaluate the capacity of marine protected communities to provide a buffer against the establishment of one of the most invasive species in the Mediterranean Sea: the Percnidae crab *Percnon gibbesi* (H. Milne Edwards, 1853). Here, it was tested if predation provides a higher resistance to the invasion by *P. gibbesi* in protected native communities than in exploited ones. Specifically, this study aimed to compare (a) the abundance and diversity of predator assemblages of *P. gibbesi*, (b) the predation pressure on *P. gibbesi* and (c) the density of this species in protected and unprotected areas in the Mediterranean Sea. Tethering experiments were conducted in the field to assess the relative predation rate on two size classes of *P. gibbesi*, using long and short tethers, at two protected and two unprotected sites randomly chosen on the northern coast of Sicily (Southern Tyrrhenian Sea).

The abundance and diversity of predators of *P. gibbesi* and the relative predation rate on tethered crabs were higher at protected than unprotected sites, independent of crab size and tether length; the density of *P. gibbesi* was significantly lower in protected than unprotected areas.

The findings of this study, although restricted to a small spatial scale, support the existence of mechanisms for biotic resistance in Mediterranean protected native communities and provide experimental evidence that the restoration of predator assemblages confers better invasion resistance to marine protected areas against *P. gibbesi* invasion. More generally, the present study confirms that marine protected areas are an effective tool for ameliorating the impact of some biological invasions in the Mediterranean Sea.

Keywords: alien invasion; biotic resistance; Marine Protected Areas; Mediterranean Sea, *Percnon gibbesi;* predation