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Nest-mediated parental care in a marine fish: Are large-scale nesting habitats selected and do these habitats respond to small-scale requirements?

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Abstract

Fishes have evolved various reproductive strategies including mechanisms that involve parental care and demersal eggs laid into nests. *Symphodus ocellatus* has a seasonal reproduction period during which large, dominant males become territorial and build nests with fragments of algae, where they attract females to spawn and provide care to the developing eggs. Based on the hypothesis that the *S. ocellatus* males choose the reproductive habitat based on some characteristics of the substrate, here we assessed whether, on a coastal area scale, the distribution of this species changes during the reproductive period because of the selection of some suitable sites or substrates, and whether the nesting microhabitat used by this species responding to certain requirements in relation to different characteristics. From April to September 2010, at four locations and on three substrate types, the fish were counted in three periods related to different stages of reproduction. Furthermore, several physical and biological variables have been recorded around numerous nests to select those with more recurrence. We found that *S. ocellatus* prefers to live on rocky substrates populated by photophilic algae, regardless of the phases of the reproductive cycle. We identified depth (1.7–3.2 m), the presence of a hole, a 10–20 cm algal canopy, and high algal coverage of Dyctiotales as nest requirements. *S. ocellatus* is mostly distributed in coastal sites sheltered from the action of waves. This allows the construction and maintenance of nests and the possibility to remain in a water temperature range similar to the reproductive physiological constraints.

Keywords: Nest-building; Labridae; habitat selection; habitat requirement; *Symphodus ocellatus*.

Introduction

Many marine fish species inhabit shallow coastal areas, where anthropogenic disturbances tend to be most frequent and severe, representing the main threat to their survival. Because life history strategies of coastal fish are in association with high habitat specialization, these animals are particularly vulnerable both to habitat loss/degradation and to exploitation (Reynolds *et al.*, 2005). Fish species have evolved various strategies to increase their reproductive success, including simple processes (e.g., reproduction of pelagic species in the water column) and complex mechanisms that involve parental care as demersal eggs laid within nests (Andersson, 1994; Balon, 1975; Taborsky *et al.,* 1987). *Symphodus ocellatus* (Linnaeus, 1758) is a nesting wrasse that is widespread in shallow rocky and vegetated areas of the Mediterranean Sea, Black Sea, and Sea of Azov (Quignard & Pras, 1986). This species has a seasonal reproduction period (from May to early August) during which large, dominant males become strictly territorial and build nests with fragments of algae, to which they attract females to spawn and provide care to the developing eggs (Lejeune, 1985; Warner & Lejeune, 1985; Taborsky *et al.*, 1987; Sinopoli *et al.*, 2015). Dominant building males are often helped by satellites males (with a slightly different color pattern) to defend the nests from other opportunist males (sneakers) (Taborsky *et al.*,1987; Taborsky, 1994, Alonzo *et al.*, 2000). Females visit multiple nests before selecting one for spawning (Taborsky *et al.*,1987) and seem to