

The refugium theory revisited: exploiting juvenile fish while preserving large adults

In this issue of *Scientia Marina* a paper by J.F. Caddy addresses a central problem of Mediterranean fisheries, namely, overexploitation when juveniles are the main target. Although the author centres his concerns on the fishery for hake in the Mediterranean, the problem is of a general nature and embraces several commercial species. Three questions are raised by Caddy. Firstly, the paradigm that assumes that a refugium exists for spawners is not in agreement with the standard paradigm accepted in fisheries management, namely “let the fish grow and reproduce before catching them”. According to the refugium theory, large hake migrate to areas on the continental slope that are untrawlable. That is why spawning stocks were preserved more or less untouched in the 1970s and earlier, ensuring that recruitment was conserved and the spawning stock was not overfished to the point of collapse. Current fishing efforts exerted on the refugium could have a negative impact on recruitment. Secondly, the problem of realistically modelling natural mortality (M) of juveniles can be tackled by following Caddy’s proposal that M is an inverse function of age, in such a manner that juveniles suffer high M . Thirdly, the MSY (maximum sustainable yield) concept is discussed for a fishery on juveniles, in which MSY is currently the target proposed by the United Nations (UN) and the European Union (EU), and is the management target discussed in many fora.

It is clear that the fisheries management recommendations presented in Caddy’s paper may be controversial among the scientific community, stock modelers and fisheries managers. To a certain extent, these recommendations may be seen to contradict some of the basic ideas included in the EU’s Common Fisheries Policy. Although the paper might come into conflict with the traditional scheme for scientific advice and fisheries management followed in EU waters, we believe that the novel ideas presented in this manuscript should help to foster the debate among scientists and managers who aim to investigate new management strategies to tackle the current problems facing a number of Mediterranean fish stocks in which juveniles constitute a major component of the fishery.

Due to the potential controversy this paper could generate, the Editorial Board of *Scientia Marina* has decided to publish a reply from one of the referees of the paper (H.-J. Rätz), as well as the answer to this commentary by J.F. Caddy. *Scientia Marina* wishes the reader of these documents an enjoyable and fruitful reading.

Josep Lloret, University of Girona, Catalonia, Spain
Jordi Lleonart, Institute of Marine Sciences (CSIC), Catalonia, Spain