



ELSEVIER

Deep-Sea Research II ■ (■■■■) ■■■–■■■

DEEP-SEA RESEARCH
PART IIwww.elsevier.com/locate/dsr2

Spatial and temporal distribution of the early life stages of three commercial fish species in the northeastern shelf of the Gulf of Cádiz

F. Baldó^{a,*}, E. García-Isarch^a, M.P. Jiménez^b, Z. Romero^b, A. Sánchez-Lamadrid^a,
I.A. Catalán^a

^aCentro de Investigación y Formación Pesquera y Acuicola El Toruño, Junta de Andalucía, C/ Jac. IV, Km 654, 11500 El Puerto de Santa María, Cádiz, Spain

^bInstituto Español de Oceanografía, Apt. 2609, 11006 Cádiz, Spain

Received 1 February 2005; accepted 2 April 2006

Abstract

Monthly cruises were carried out during an annual cycle in a coastal fringe located at the northeastern shelf of the Gulf of Cádiz, characterised by its important and diverse fishery activity, in order to study the ichthyoplankton abundance, composition and seasonality. From March 2002 to March 2003, the abundance of fish eggs and larvae was estimated monthly at 26 sampling stations in the area. The mean abundance through the analysed period was 955 eggs/100 m³ and 326 larvae/100 m³ of the total species of fish caught. Higher mean densities occurred during the warmest months. Three commercially important species in the area (anchovy *Engraulis encrasicolus*, sardine *Sardina pilchardus* and wedge sole *Dicologlossa cuneata*) represented 57% and 50% of mean fish eggs and larval concentrations, respectively. Anchovy eggs and larvae were the most abundant in the area, each representing 33% of the total mean fish egg and larval concentrations. Temporal variations in the abundance of eggs and larvae showed different reproduction patterns for the analysed species: while anchovy reproduction mainly occurred during the spring–summer period, sardine reproduced during autumn–winter whereas wedge sole was mainly winter–spring spawner in the area. Furthermore, the spatial distribution was different for the early stages of these three species. Cluster analysis of the sampling stations (based on Bray–Curtis similarities derived from the annual mean concentrations of eggs and larvae of the three species) revealed four well-defined areas: a coastal western sector, a coastal eastern sector, an offshore sector and a single sampling station, close to the Guadalquivir River mouth, which showed a high degree of accordance with the oceanographic characterisation of the area.

© 2006 Published by Elsevier Ltd.

Keywords: Ichthyoplankton; Fish eggs; Fish larvae; Multivariate analysis; *Engraulis encrasicolus*; *Sardina pilchardus*; *Dicologlossa cuneata*; Gulf of Cádiz; SW Spain

1. Introduction

The Gulf of Cádiz (ICES region IXa) is an area with an important fishery activity involving different fishing types and target species, related to the

*Corresponding author. Tel.: +34913473735; fax: +34914135597.

E-mail address: francisco.baldo@md.ieo.es (F. Baldó).