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## MAIN BIOLOGICAL INDICATORS OF JACK MACKEREL (*Trachurus murphyi*)

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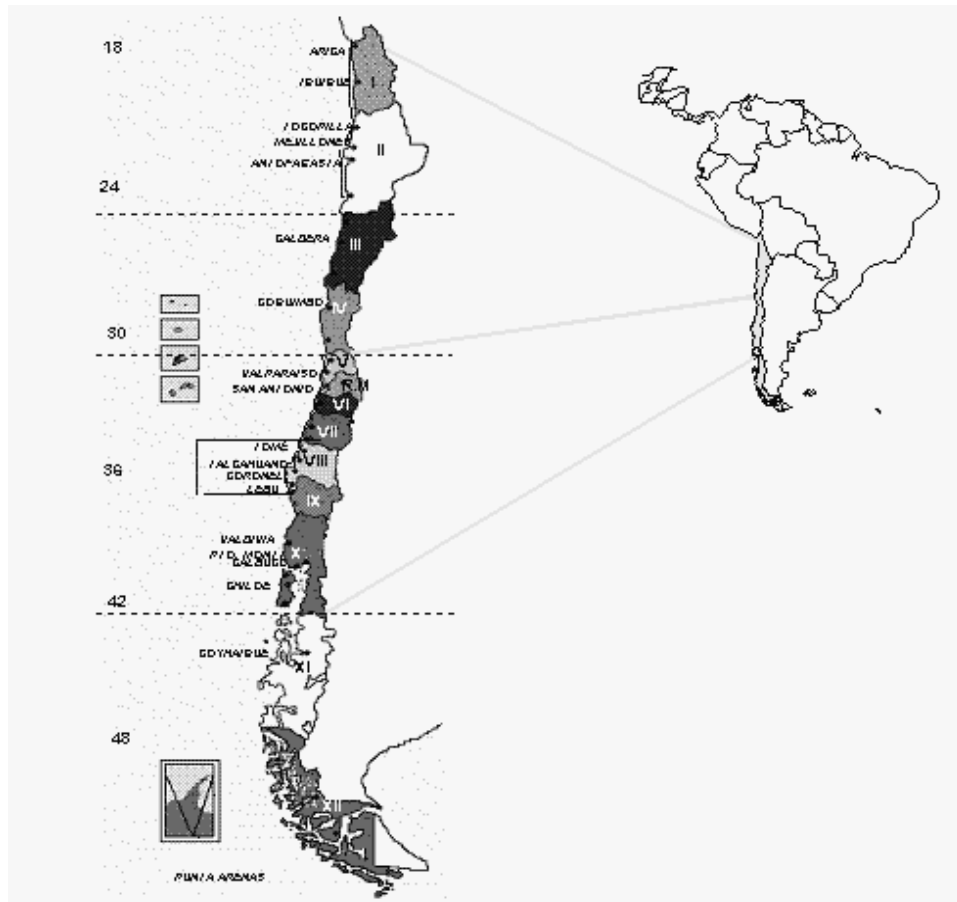
### INTRODUCTION

This document presents historical biological indicators for the jack mackerel caught off the central-southern zone of Chile (32° S – 43° S); such indicators derive from sampling activities conducted by the Fisheries Development Institute (IFOP) between 1975 and 2008. They refer to size and age compositions of the catches and the condition factor of the resource. Results show that important recruitments determined changes in size and age structures. In recent years, indicators show an increase in the mean size and age and a low proportion of juveniles, as well as an increase of the condition factor.

### MATERIALS AND METHODS

The biological data derives from samplings conducted by IFOP in the main fishing ports of Chile (Figure 1) from 1975 to 2008. The data collection is based on a sampling design upgraded over time with a view to reduce measurement errors (Young et al., 2002 and 2003). Samplings to determine size composition of catches are conducted both on board and in landings (onshore), following a two and three-stage design. Length measurement corresponds to fork length with a precision of 1 cm rounded up to the nearest whole.

A biological sampling is carried out onshore, which corresponds to a size-stratified sample, in which sex, sexual maturity, total weight, gutted weight (1g), and gonad weight (0.1 g) are registered, besides otolith extraction for age determination.



**Figure 1.** Map of the area of study in Chile.

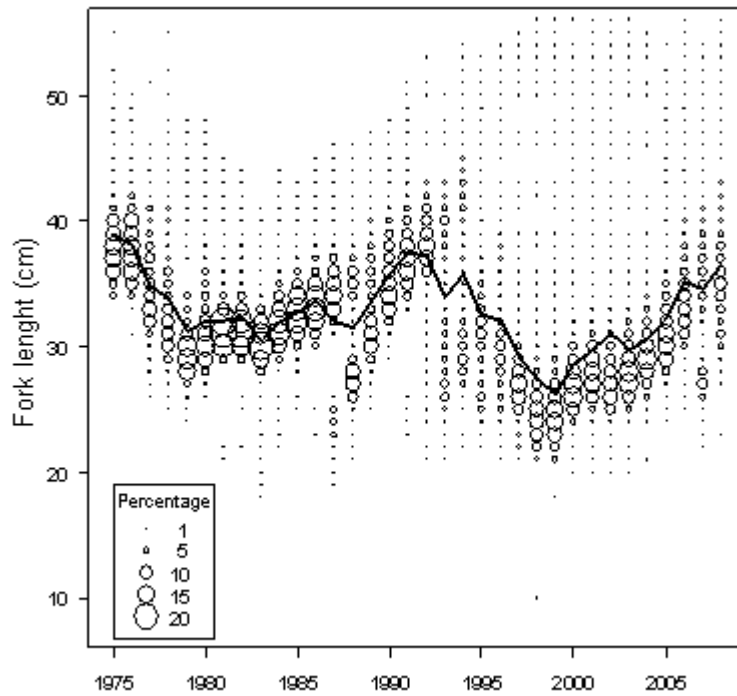
## RESULTS

### a) Size structure of catches from the central-southern fishery

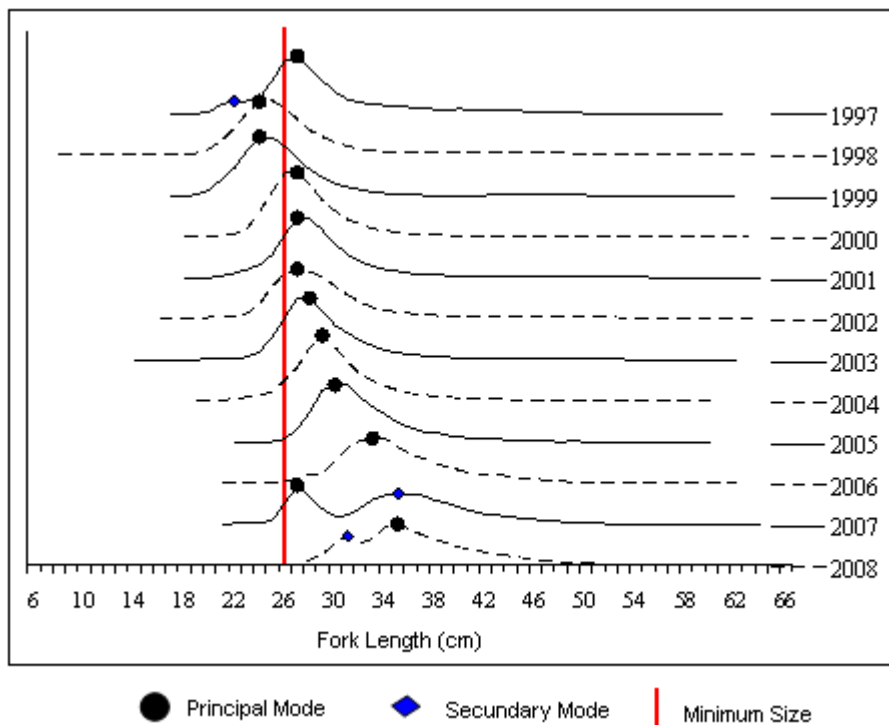
During the 1970's, the jack mackerel fishery showed sizes between 24 and 63 cm, with modes that went from 38 to 30 cm due to good recruitments that resulted from a population-increase period (Serra, 1991). This period showed low rates of juveniles, that is, individuals under 26 cm. During the 1980's, the size range showed increasing modes (from 27 to 34 cm) as a result of good annual classes registered in 1983, 1987-1988, which are consistent with El Niño events. In this decade, the international fishery developed, which coincides with the growth of the Chilean fishery.

The 1990's were characterized by the reduction of mean size of catches; modes varied from 38 cm in 1992 to 24 cm in 1999. Good recruitment in 1998-1999 led to a sustained increase of modal sizes and ages, along with a progressive scarce presence of juveniles in more recent years (Figure 2).

In that context, juvenile entrance to the fishery has been sporadic in the coastal area, with contributions in 1982-83; 1987-88; 1992-93, and of greater magnitude in 1997-98 (Figure 2 and 3) (Aranis *et al.*, 2007). 2008 is characterized by the presence of large individuals of around 35 cm, and a very scarce presence of juveniles.



**Figure 2.** 1975-2008 Size composition of catches of Jack Mackerel in the central-southern fishery.

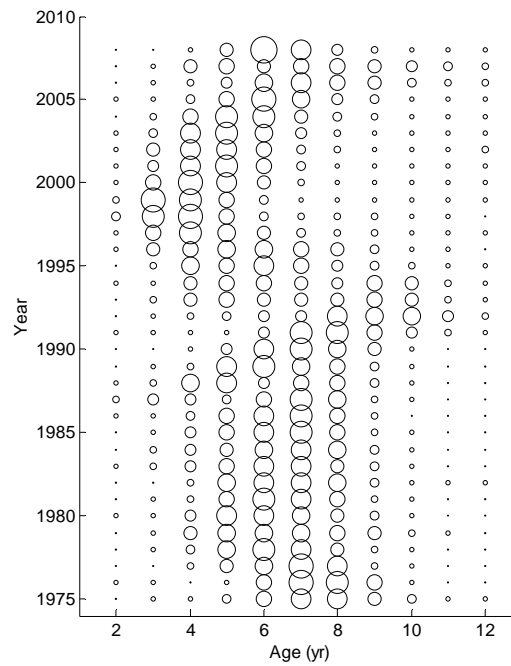


**Figure 3.** Size structure of jack mackerel in the central-southern fishery, 1997-2008.

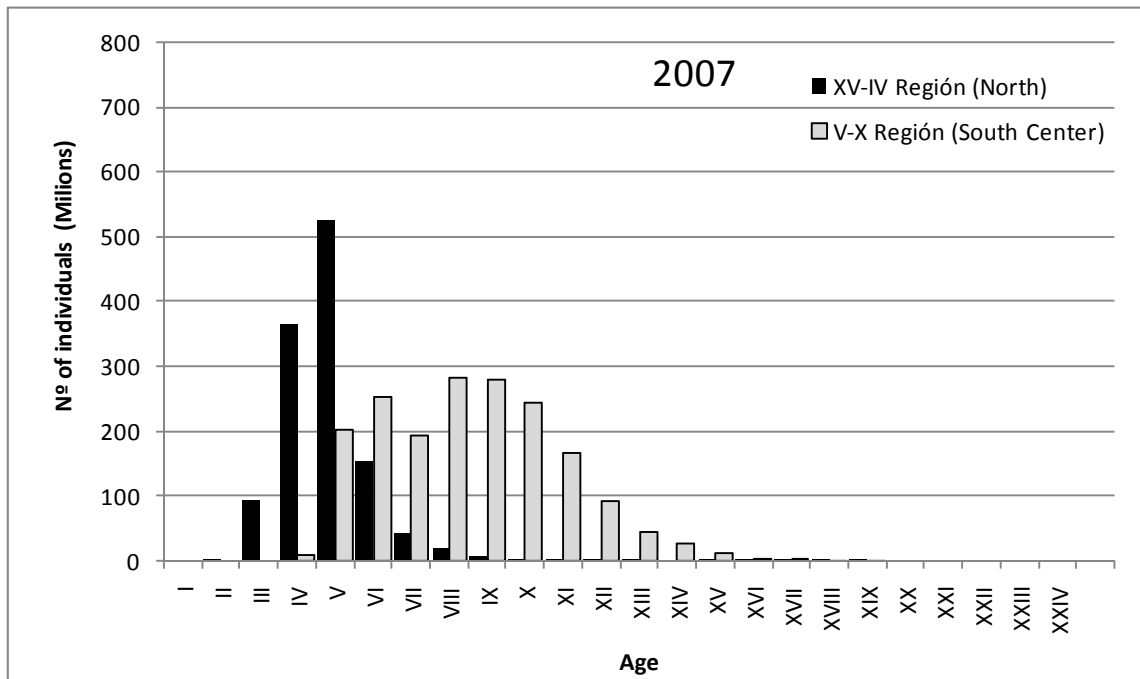
**b) Age composition of catches**

Historical age compositions are consistent with the dynamics registered in size compositions. Accordingly, the entrance of important cohorts in 1986-87 determines the increase of modal age of the catches over the years. The last good recruitment was registered in 1998, allowing an increase in the yield of the fleet in the 2000-2005 period (Figure 4)

During 2008, VII and VIII were the most important age groups, contributing 37% of catches in number of individuals (Figure 5)



**Figure 4.** Age proportion in annual composition of jack mackerel catches in the central-southern fishery 1975-2008 (2008 partial)

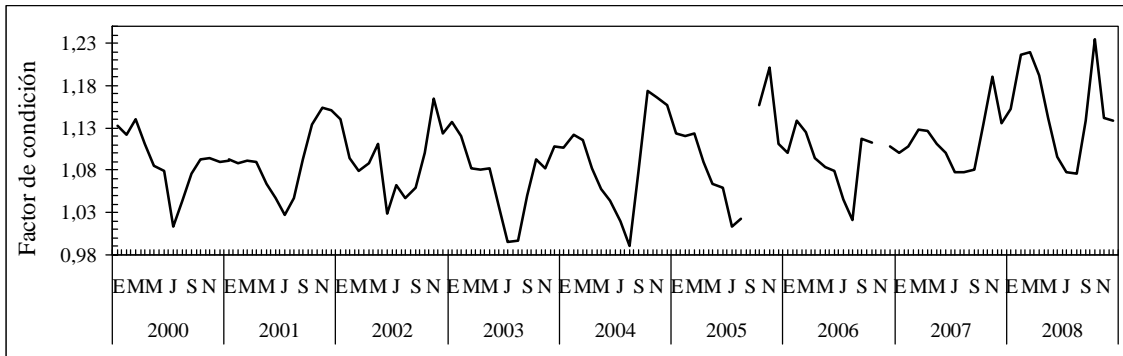


**Figure 5.** Age structure in the central-southern fishery, 2007 - 2008  
(Ages of the northern fishery are shown as a reference)

**b) Condition factor**

The condition factor measures the relationship between total weight and length ( $FL^3$ ). Results indicate that the condition factor declines in March-September, and increases later, showing an intimate association with the pre and post reproductive processes (Figure 6). At an annual

scale, this factor shows an increasing trend since 2005 to the date, which could be explained by a higher food supply due to the lower abundance of the resource



**Figure 6.** Condition factor of jack mackerel in the central-southern zone, 2000-2008.

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