Chilean Jack Mackerel Workshop

Distribution and Concentration of Jack Mackerel (*Trachurus Murphyi*) Related to Oceanographical Features between North Peru to North Chile

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Abstract

In the hypotheses related to the structure of jack mackerel population on the Southeast Pacific, it was consider the following points:

a) Between 1983 and 2005 it is possible to distinguish two opposite states, in 1983 there was a wider distribution and very high biomass whereas in 2005 there was narrow distribution and lower biomass, in north Peru jack mackerel disappeared
b) In the central-south Peru jack mackerel availability increases when cold conditions prevail on this zone.
c) In September 2001, Oceanographic Regional Survey found an important oceanic front, originated by subantartic upwelling waters at 14-15°S (San Juan), characterized by high concentration of nutrients. This activity showed good correlation with high biomass and catches of jack mackerel.
d) Latitudinal distribution of jack and pacific mackerel length structure in south Peru – north Chile showed similar structures and both fishery catches at least one modal group similar. Also, abundance of juvenile's jack mackerel is higher in north Chile.

In conclusion, during 1983 to 2007 drastically changes occurs in distribution and concentration of jack mackerel on Peruvian sea, and these changes would be linked to interdecadal and interannual changes of environmental conditions.

Keywords: Jack mackerel, Peruvian waters.

Introduction

Pelagic fishery in Peru is based mainly on anchovy, but in the present century landings of jack mackerel (*Trachurus murphyi*) and pacific mackerel (*Scomber japonicus*) are growing, based on the promotion of human consumption direct.

From the beginning of 70 landings of jack mackerel in Peru were growing, with a first peak in 1977 with 500 thousands tons. Later, there was in 2001 a landing record with 700 thousands tons (Fig. 1)

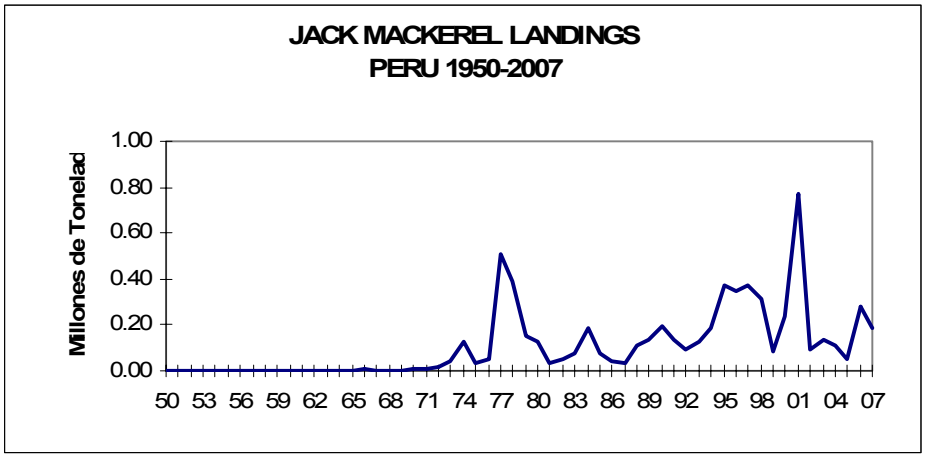

Figure 1. Jack mackerel annual landings in Peru from 1950 to 2007

This paper describes some biological aspects of jack mackerel in north Peru to north Chile, with the goal to know fisheries trends and to analyze distribution and concentration changes related to environmental conditions.

Material and methods

Study area is located between 04º 00´- 24º 00´ S., which is dominated by the Humboldt eastern boundary current system. The main pelagic species are anchovy (*Engraulis ringens*), sardine (*Sardinops sagax*), jack mackerel (*Trachurus murphyi*) and pacific mackerel (*Scomber japonicus*) (TSUKAYAMA, 1983).

Stock assesments of the main pelagic resources were made by hydroacoustic method during surveys of pelagic stock, using a SIMRAD echosounder - echointegrator EK 500 and EK 400 operating at 120 and 38 Khz to a depth of 250 m (IMARPE, 1997).
Sea surface temperature was taken from land oceanographic station at Ilo (17º30'S). Also we consider data from IV Regional Oceanographic Survey in September 2001. Biometrics and biological samplings of pelagic species were made and species composition of catch, biological aspects, size structure, individual weight, sex and sexual maturity recorded.
Results and Discussion

One of the most productive fishing areas of the world is found in Peru and Chile. The productivity of their fishing grounds is due to the system of currents along their coastline, associated with upwelling processes that support great biomass of large pelagic resources, mainly jack mackerel (ZUTA, *et al.,* 1976)

In the hypotheses related to the structure of jack mackerel population, it was consider the following points:

e) Between 1983 and 2005 it is possible to distinguish two opposite states, in 1983 there was a wider distribution and very high biomass whereas in 2005 there was narrow distribution and lower biomass, in north Peru jack mackerel disappeared (Fig. 2).

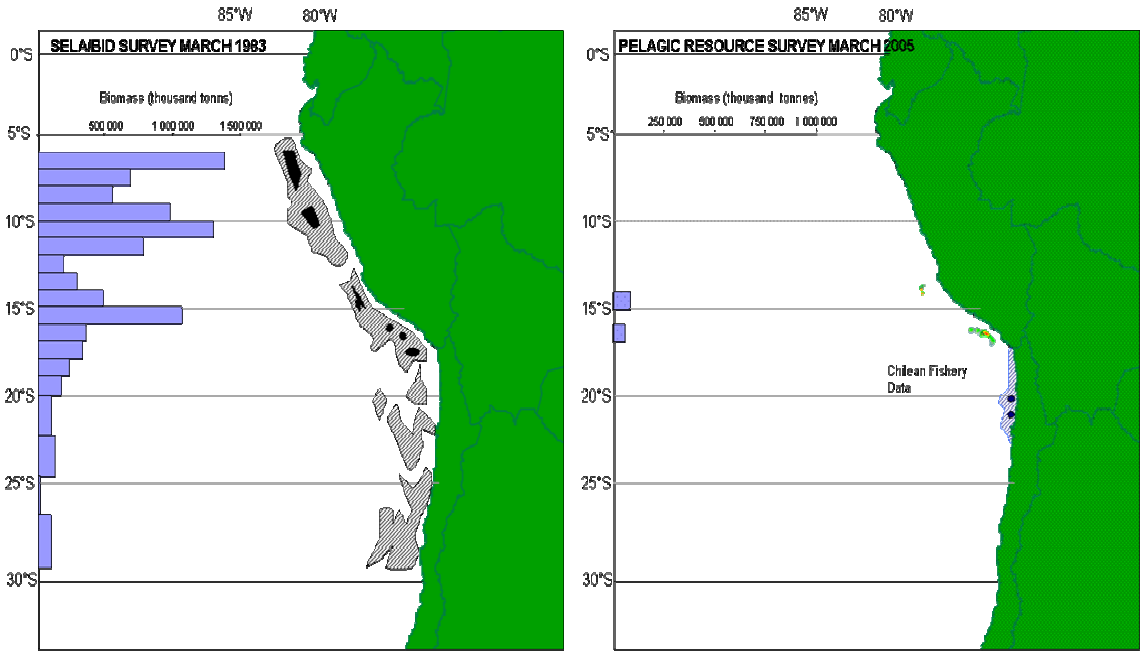

Figure 2. Jack mackerel distribution on March 1983 and March 2005

Also in biomass levels there were two states, one of them with high biomass from 1983 to 1995 and other with low biomass from 1998 to 2007 (Fig. 3). The medium biomass at first state was 5 millions tons and in second state was about 500 thousands tons.

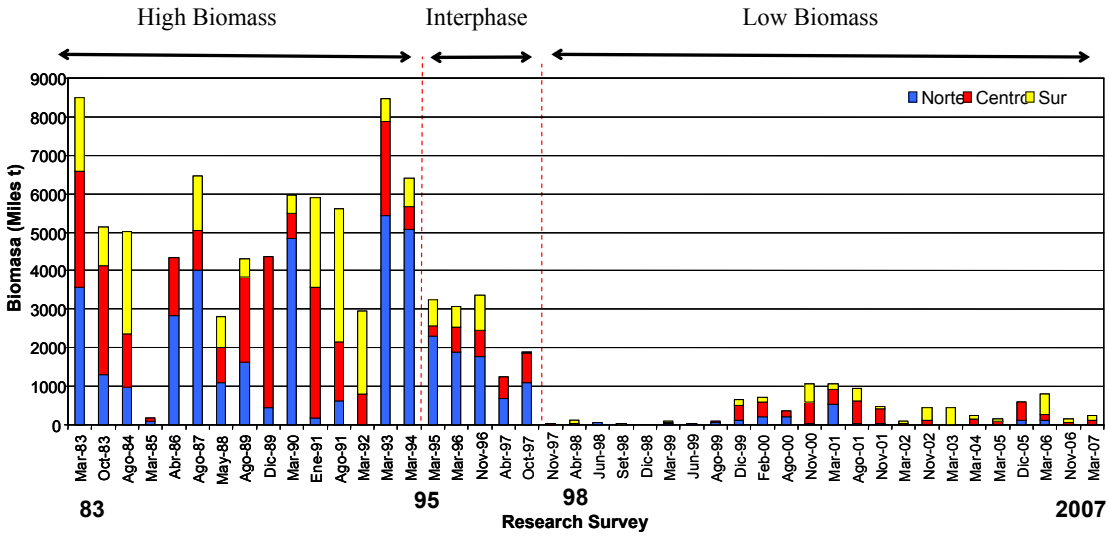

Figure 3. Jack mackerel biomass in Peru from 1983 to 2007

f) In the central-south Peru jack mackerel availability increases when cold conditions prevail on this zone.

Distribution of jack mackerel catch by latitudinal degree in Peru, during 1990 – 2004 (Fig. 4), shows clearly a change since 1998, passing from a distribution located mainly to north 10ºS, to a central-south distribution, disappearing from north region. These situation starts in 1996 and was more notary since 2000, associated to cold conditions in south Peru, like it was showed by thermal anomalies at Ilo, mainly during 2001 to 2004.

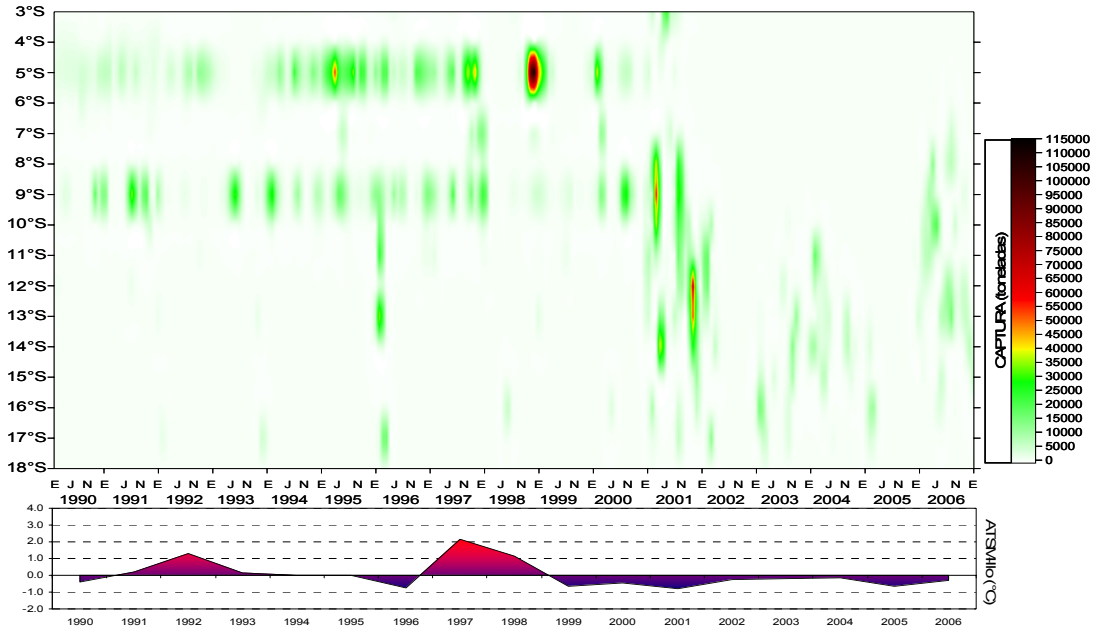

Figure 4. Monthly distribution of jack mackerel catch related to thermal anomalies in Ilo (1990 - 2007)

g) In September 2001, Oceanographically Regional Survey found an important oceanic front, originated by subantartic upwelling waters at 14-15°S (San Juan), characterized by high concentration of nutrients (CPPS, 2002). This activity showed good correlation with high biomass and catches of jack mackerel (Fig. 5). Also there was a homogeneous surface lawyer of temperature between Pisco (14ºS) and Iquique (21ºC), who probably let great movements of jack mackerel between north Chile and south Peru.

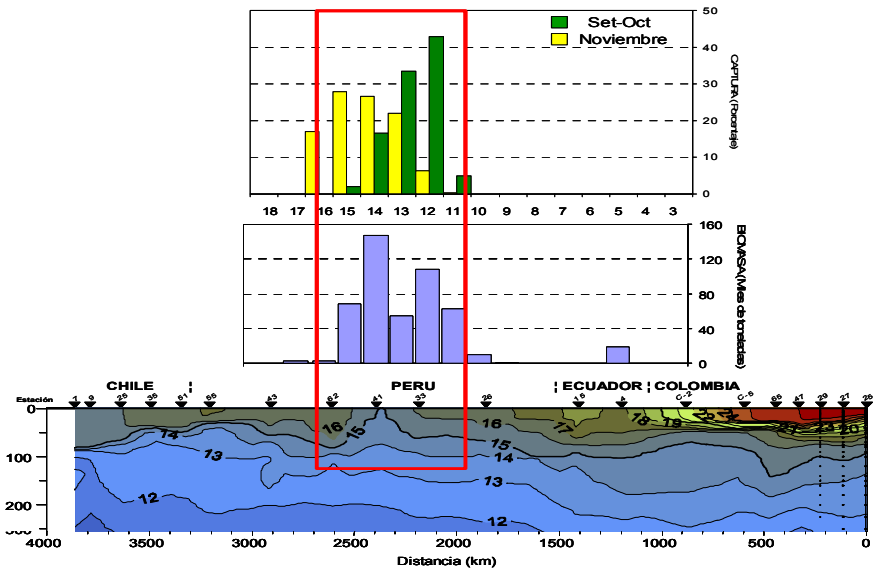

Figure 5. Water column (200 km) off South American coast related to Jack mackerel biomass and catch (September 2001).

h) Latitudinal distribution of jack and pacific mackerel length structure in south Peru – north Chile showed similar structures and both fishery catches at least one modal group similar (Fig. 6). Also, abundance of juvenile's jack mackerel is higher in north Chile.

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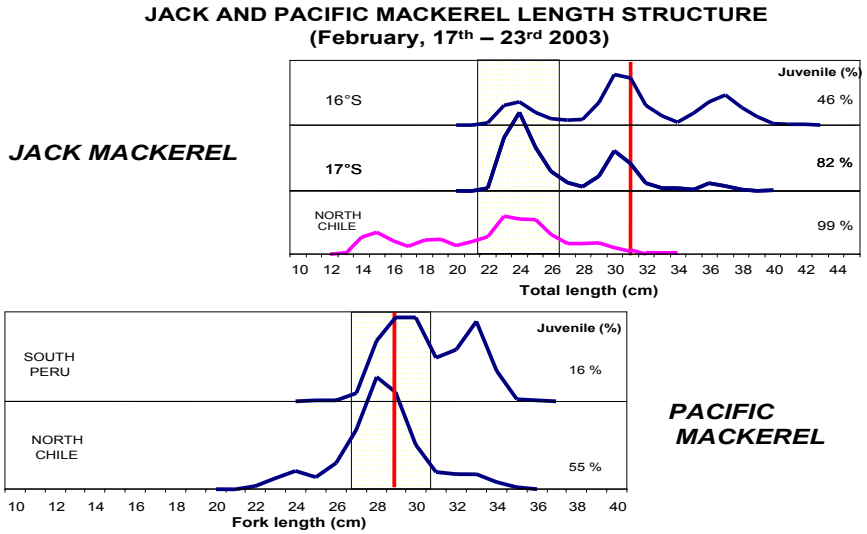

Figure 6. Jack and Pacific mackerel length structure (February, 17th – 23rd 2003)

In a wide description, data from annual length structure between 4-18º S show a smoothed trend to get biggest individuals in the north part of their distribution, like it was mainly in 1999 and 2006 (Fig. 7)

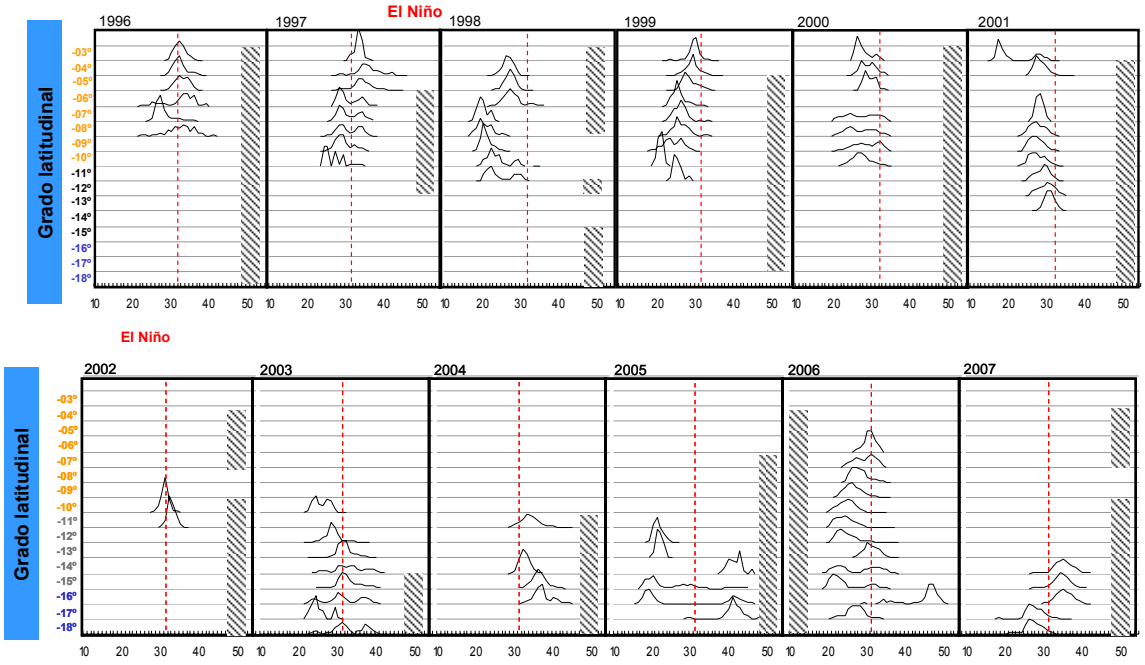

Figure 7. Jack mackerel annual length structure by latitudinal degree (1996-2007)

In conclusion, during 1983 to 2007 drastically changes occurs in distribution and concentration of jack mackerel on Peruvian sea, and these changes would be linked to interdecadal and interannual changes of environmental conditions, and they will be important for to test hypothesis about the structure of jack mackerel population, and also for resource management.

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