

SCIENTIFIC WORKING GROUP - SPFMRO

**Research for management of
Chilean Jack Mackerel (*Trachurus murphyi*)
exploited in the South East Pacific Ocean**

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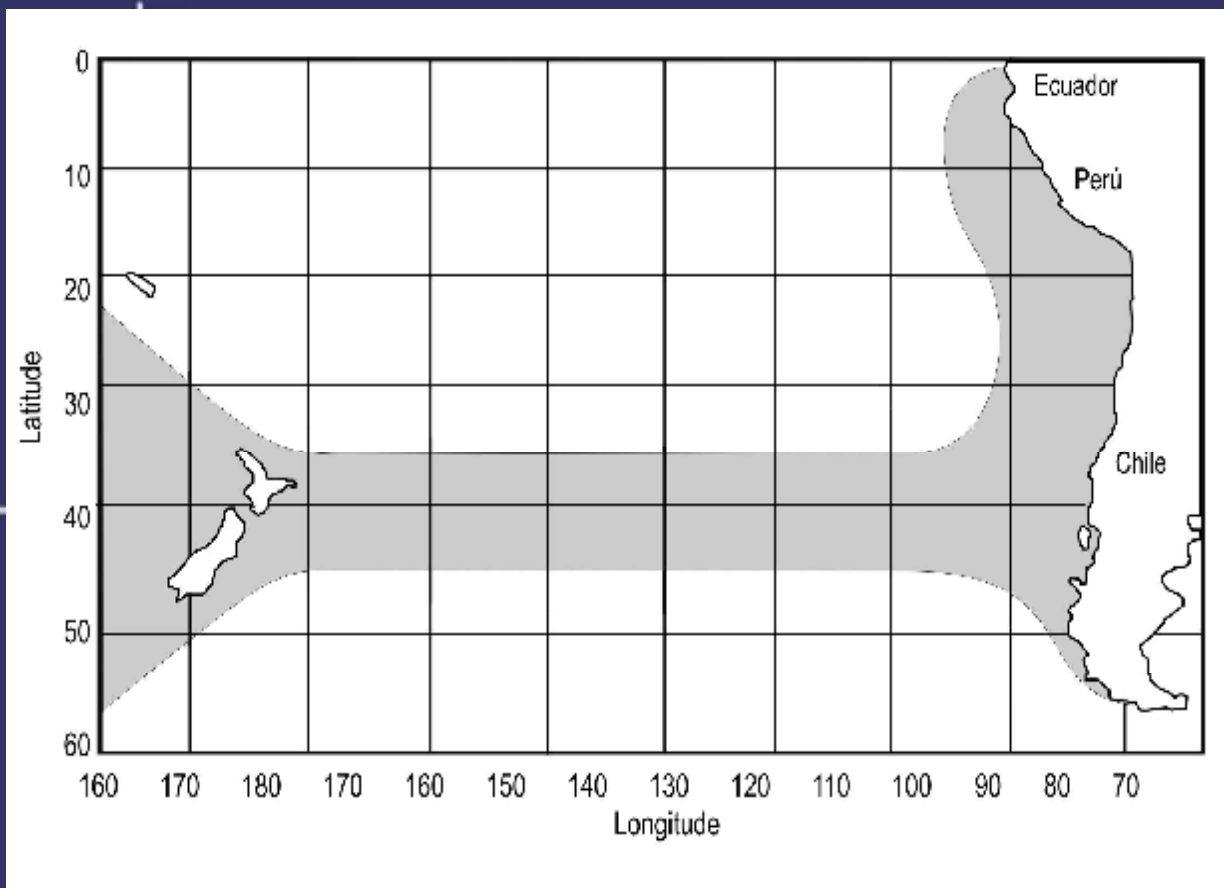
Viña del Mar, Chile, April of 2007



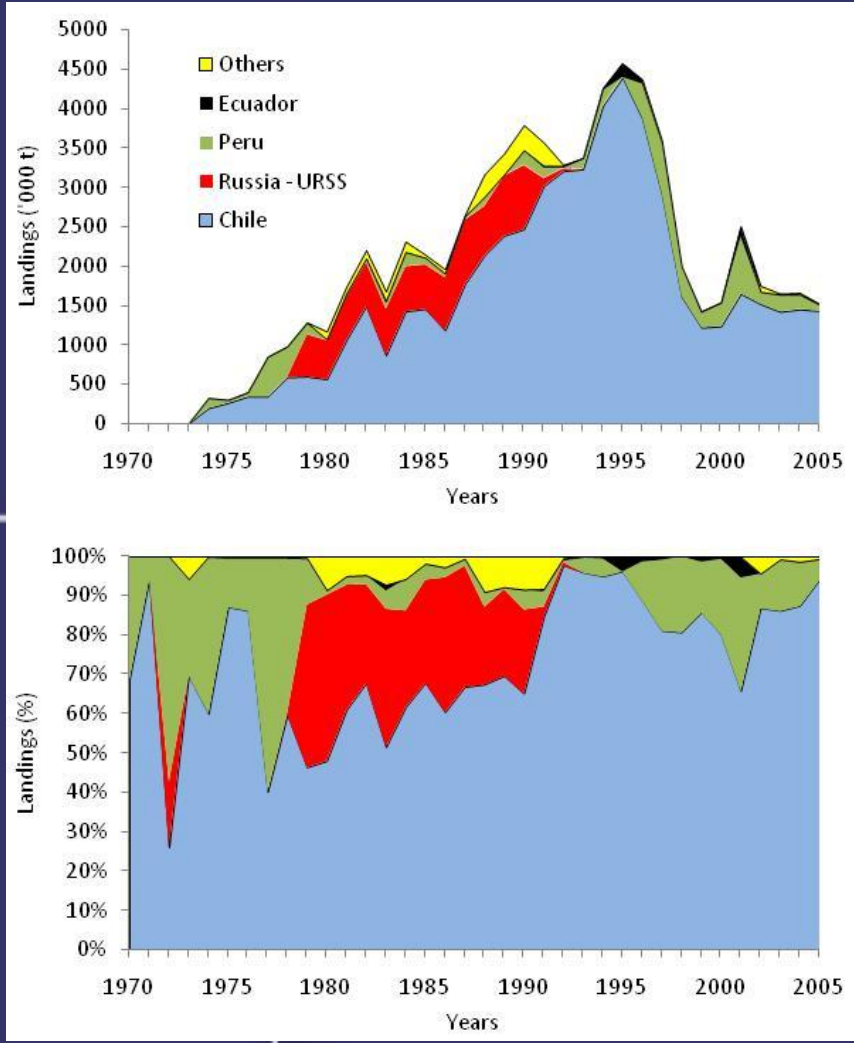
Subsecretaría de Pesca



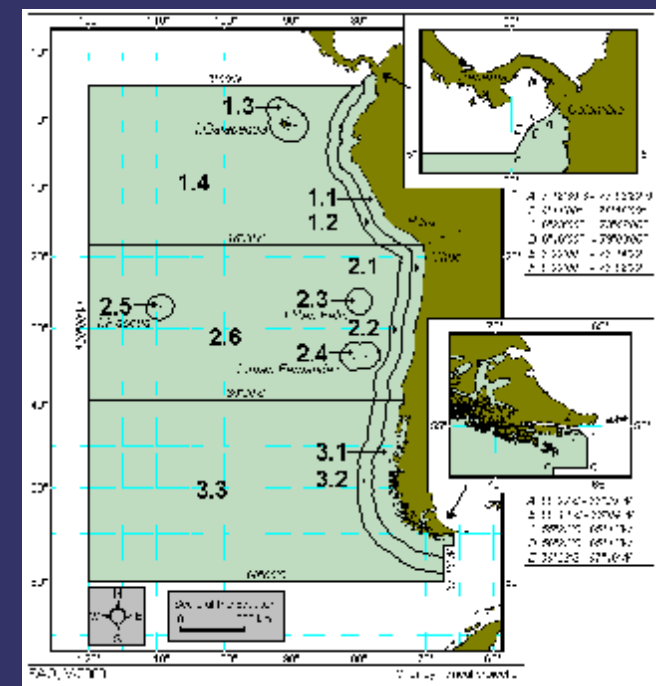
Distribution of jack mackerel (*Trachurus murphyi*) in the South Pacific Ocean



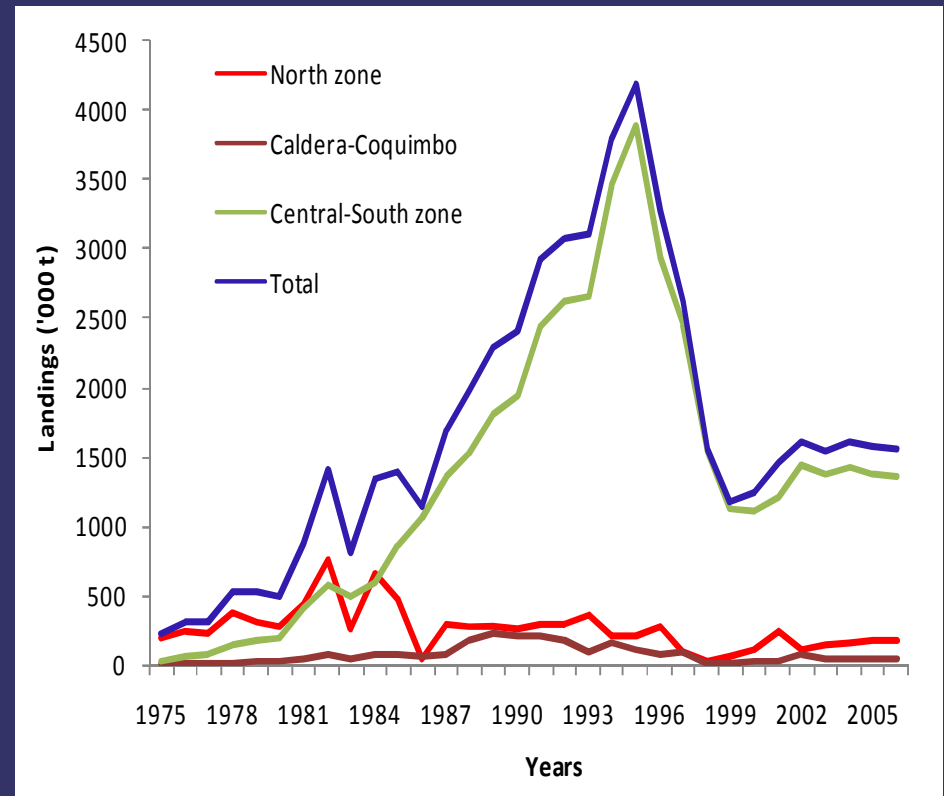
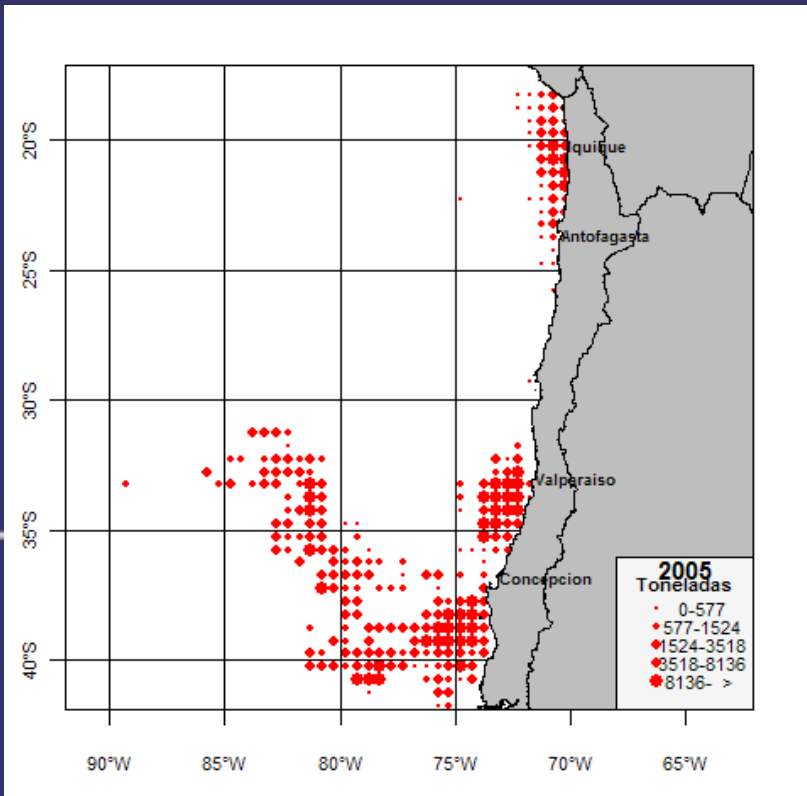
Jack mackerel landings in South East Pacific (FAO Area 87)



In the past 16 years, average annual Chilean catches have amounted to 86% of the landings recorded in FAO statistical area 87



Jack mackerel landings in Chile



Since 2001, catch levels stabilized at around 1.5 million tons per year, as a result of the maximum allowable catch quotas established by the fisheries authorities.



Governmental research for jack mackerel management

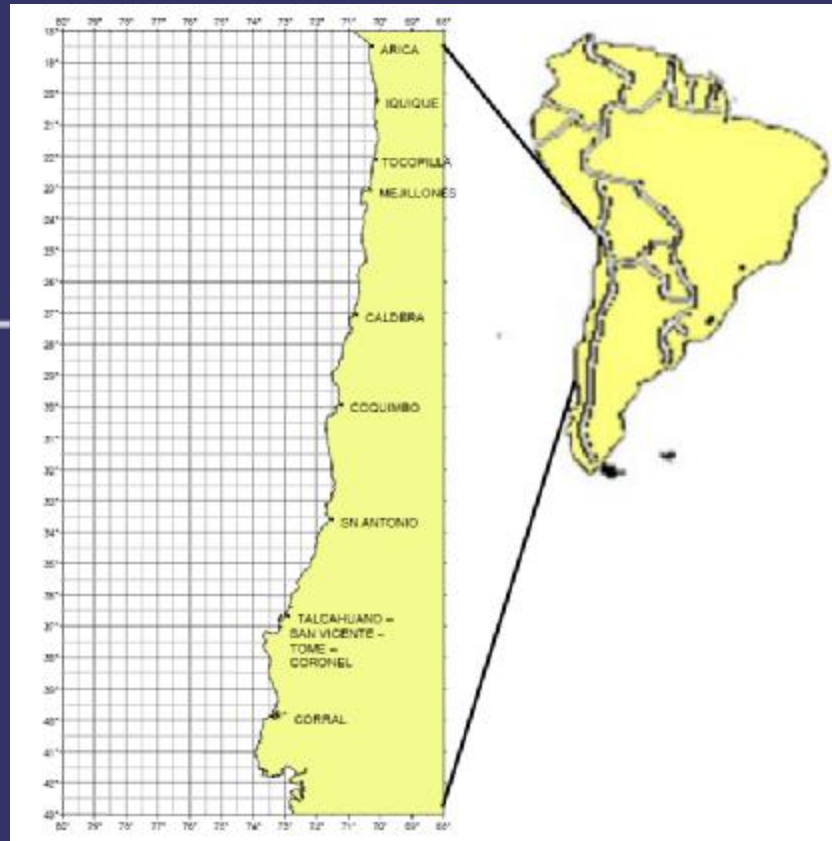
In the period 1993 - 2005 alone, over 67 research projects on jack mackerel have received funding. The researches for the jack mackerel management has been conducted by 4 main programs:

- Monitoring of national fisheries
- Acoustic surveys program
- Monitoring of reproductive conditions
- Stock assessment and TAC estimation

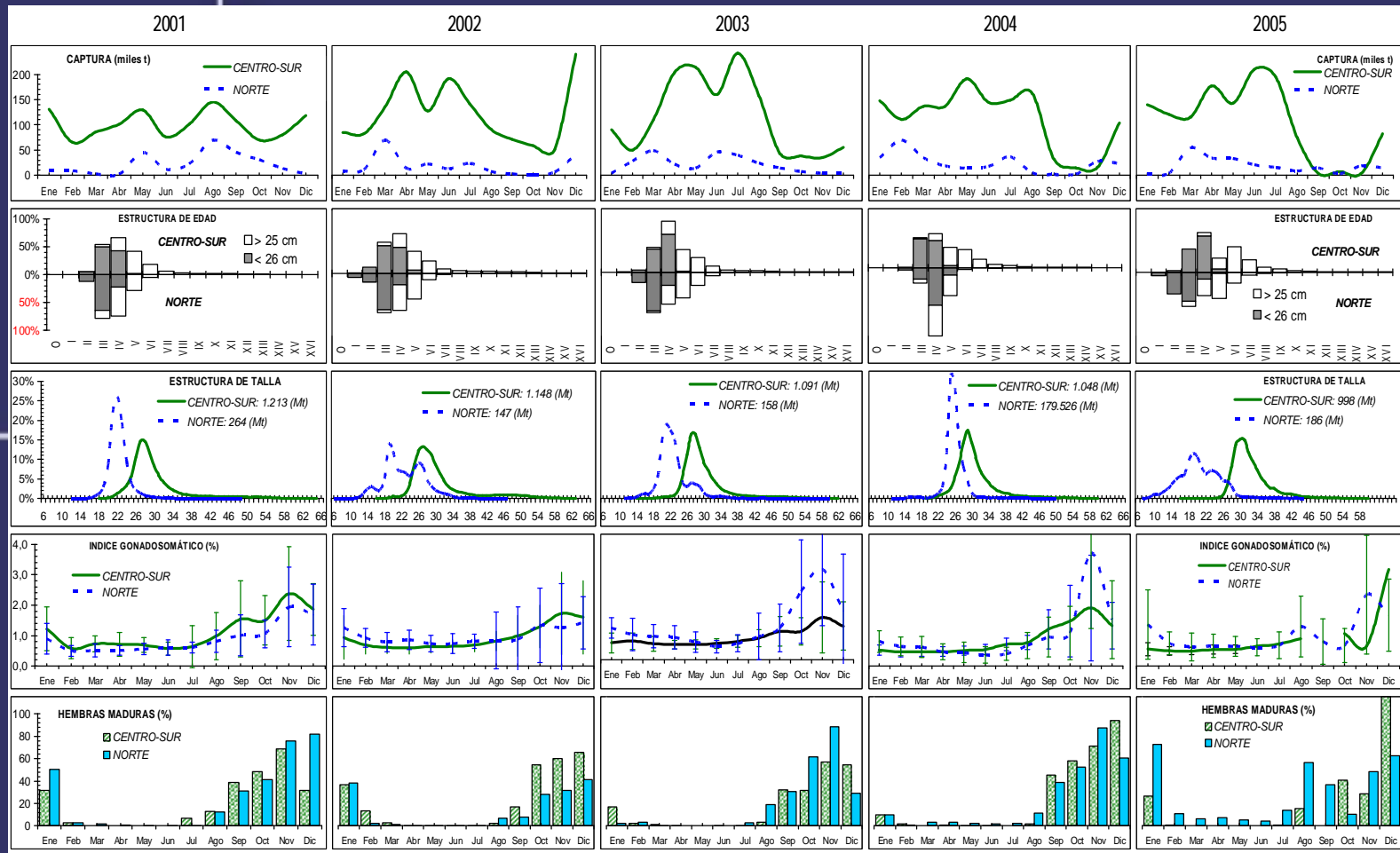


Monitoring of national fisheries

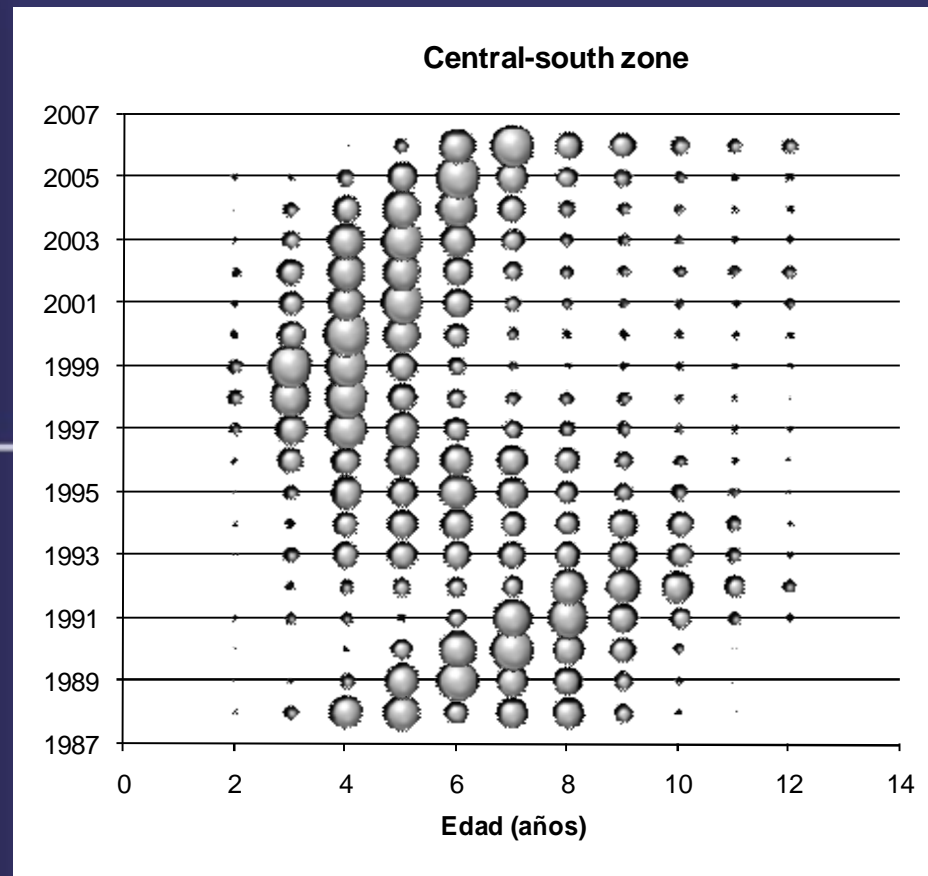
This program is dedicated to collecting all the biological and fishing data related to the activities of the Chilean fleet. This program is conducted by Fisheries Development Institute (IFOP) since 1980



- The results are summarized and reported periodically for management purposes. For example

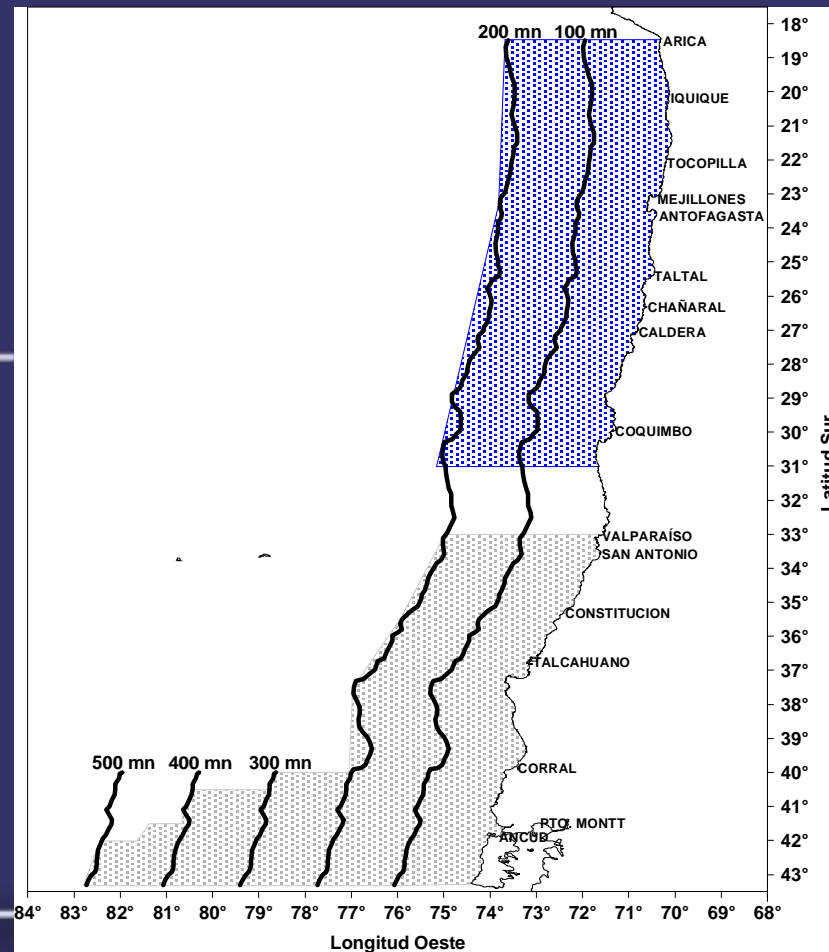


- Other example; the historical data on the age composition of jack mackerel catches reflects the main changes experienced by the stock over time



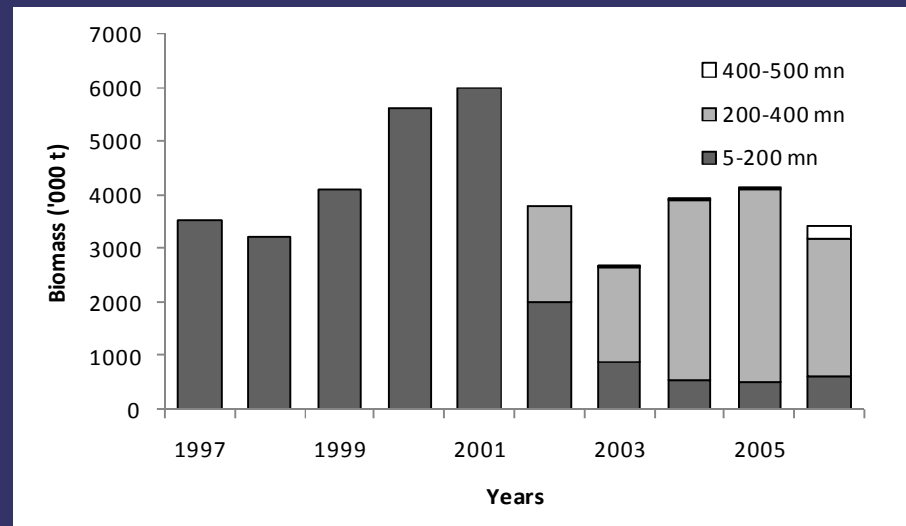
Acoustic surveys program

This program is carried out since 1980 by IFOP, and are intended to estimate the abundance, spatial distribution and age composition of the resource. This is made between May and July.



Acoustic surveys program

Between 1980 and 2006, 55 surveys were conducted in which jack mackerel was the target species



In the central-south zone, since 2002 the biomass inside the first 200 nautical miles dropped to substantially lower levels than those recorded in previous years



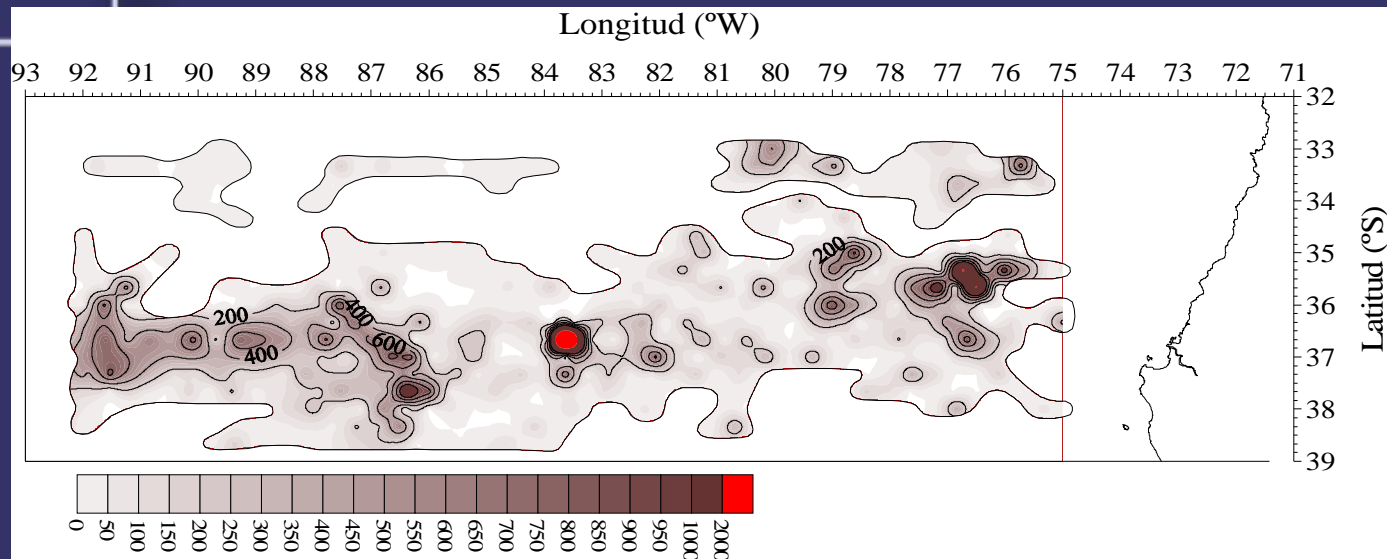
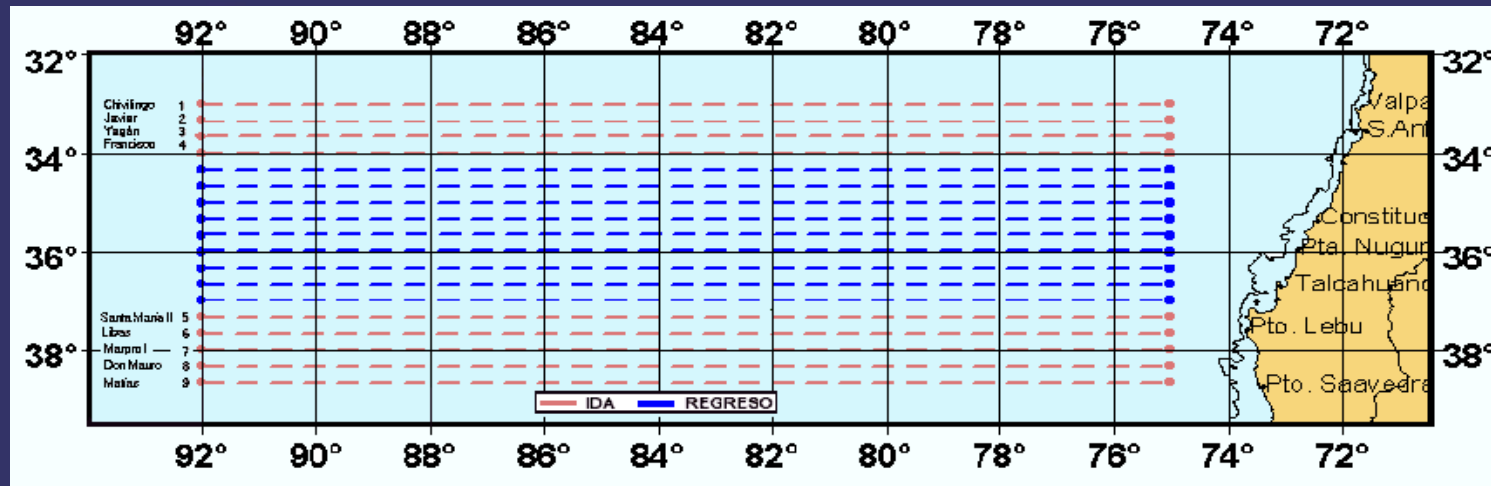
Monitoring of Reproductive Conditions

This monitoring is carried out by Fisheries Research Institute (INPESCA) since 1999.

- Main objective: to estimate the relative abundance indices of jack mackerel eggs and larvae in the center-south ocean area.
- Another relevant result is to provide relative estimates of the spawning biomass using the Daily Egg Production Method (DEPM)



Monitoring of Reproductive Conditions



Monitoring of Reproductive Conditions

The spawning biomass estimated through DEPM in 2005 was 1.043 million tons, this means the lowest estimate in the historical series and very similar to the one reported in 2003

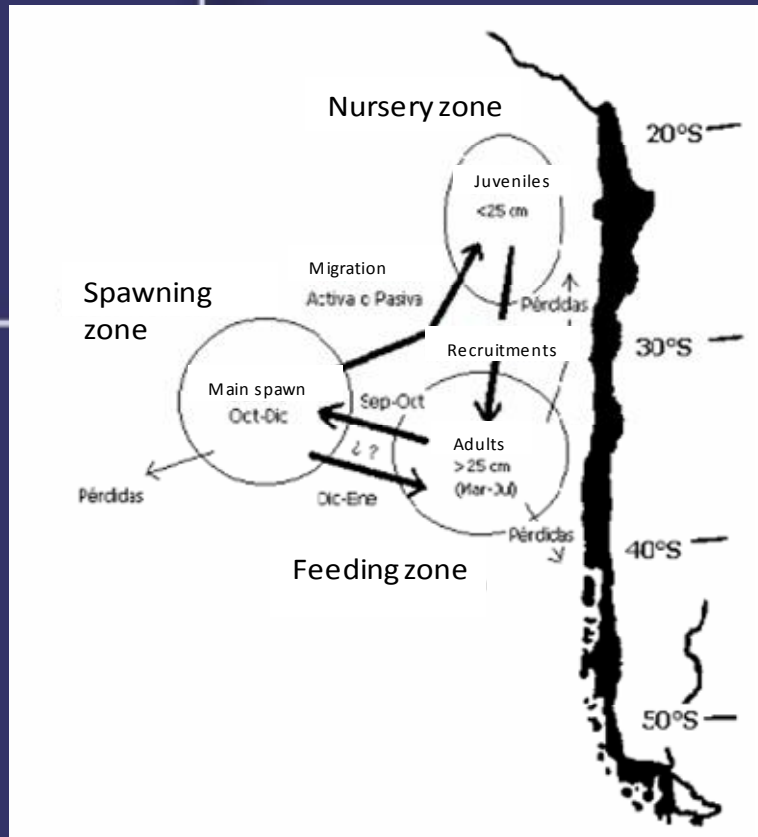
Year	Mean weight (g)	Partial fecundity (n° oocytes)	Spawning frequency	Sexual proportion	Eggs production (eggs m ⁻² d ⁻¹)	Spawning Area ('000 Km ²)	Spawning Biomass ('000 t)
1999	191.8	26610	0.13	0.43	65275	664	5724
2000	211.0	26069	0.15	0.47	49163	823	4688
2001	223.7	27150	0.10	0.39	46217	600	5627
2003	394.7	39846	0.09	0.48	9204	648	1388
2004	412.1	39957	0.19	0.48	27318	1054	3287
2005	364.7	40463	0.14	0.47	9940	774	1043

The spawning biomass tendency suggest a declination



Migration model

The Chilean research has allowed generate a spatial movement model of jack mackerel (Arcos et al, 2001)

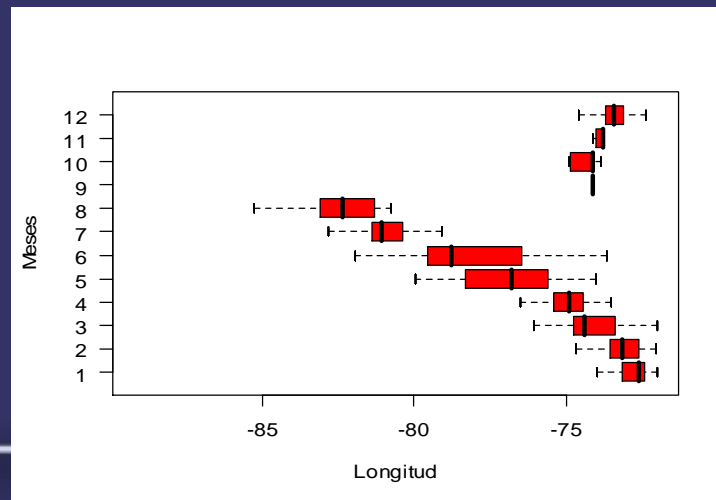
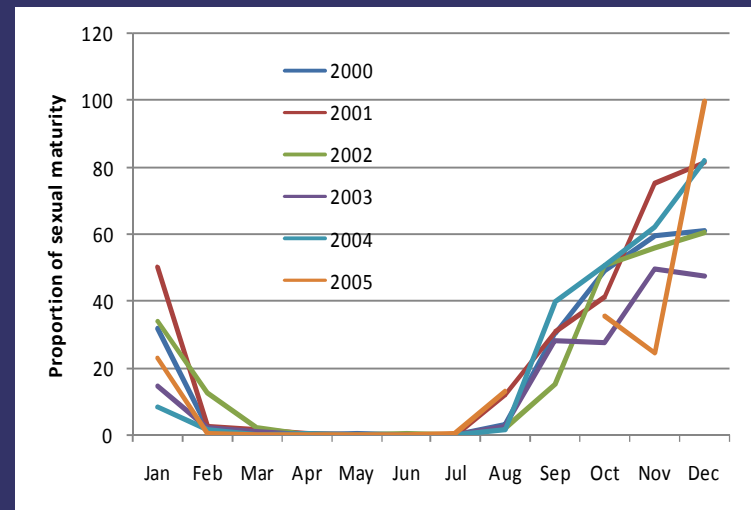
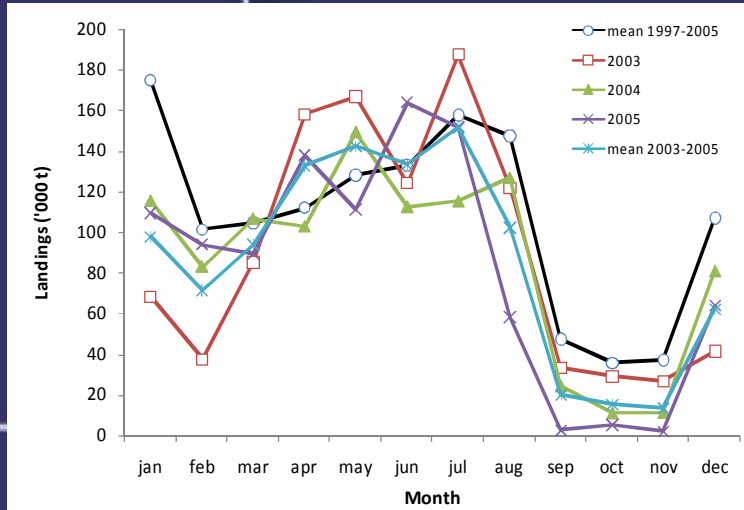


- The main nursery area is found in northern Chile, preferably inside the EEZ
- The main feeding area is located along of the Chilean Coast, inside the high-productivity zones
- The main spawning area is located off the center area of Chile, but this process begins inside the EEZ, extending towards the high seas.



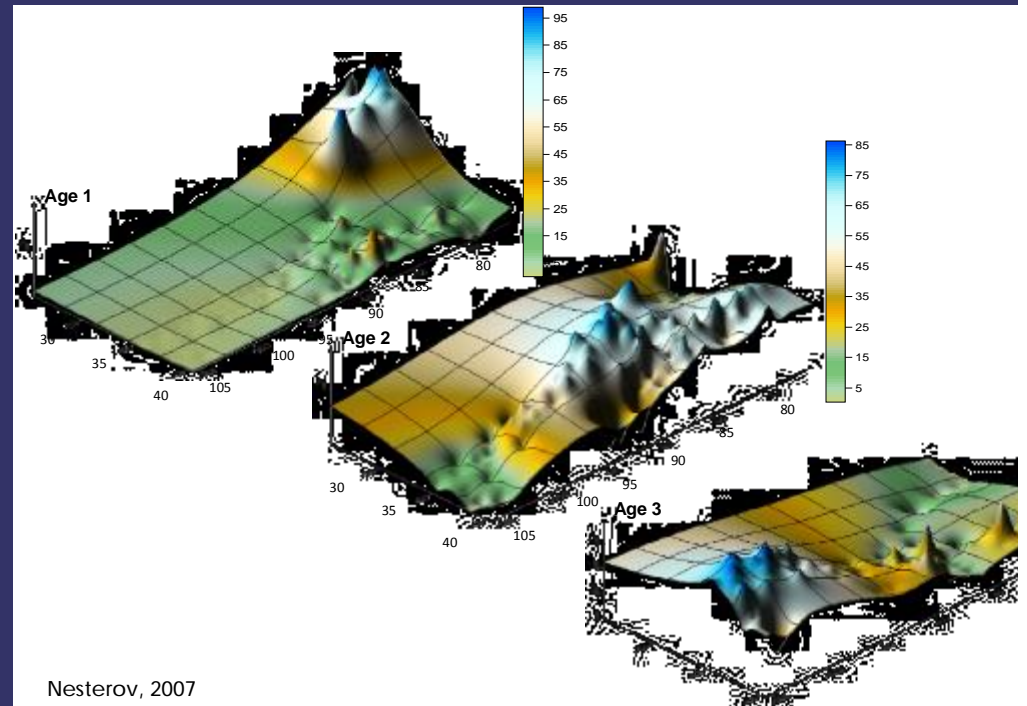
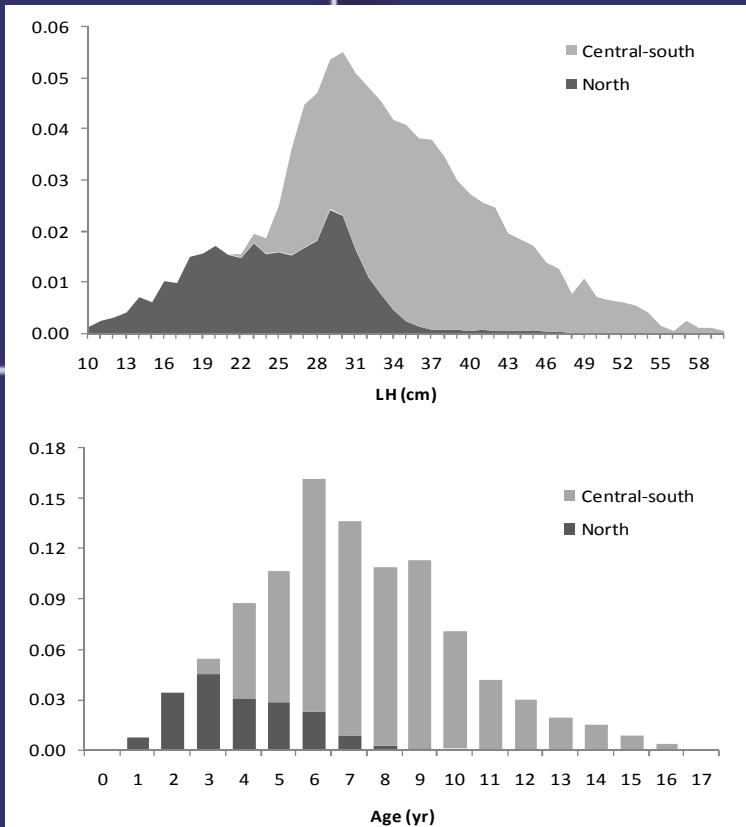
Migration model: fundamentals of spawning and feeding zone

1) The reproductive and trophic migration determine a marked seasonality of the fishery inside and outside the Chilean EEZ



Migration model: fundamentals of the nursery zone

2) The young fishes are concentrated mainly in north zone, and adults towards the central-south zone

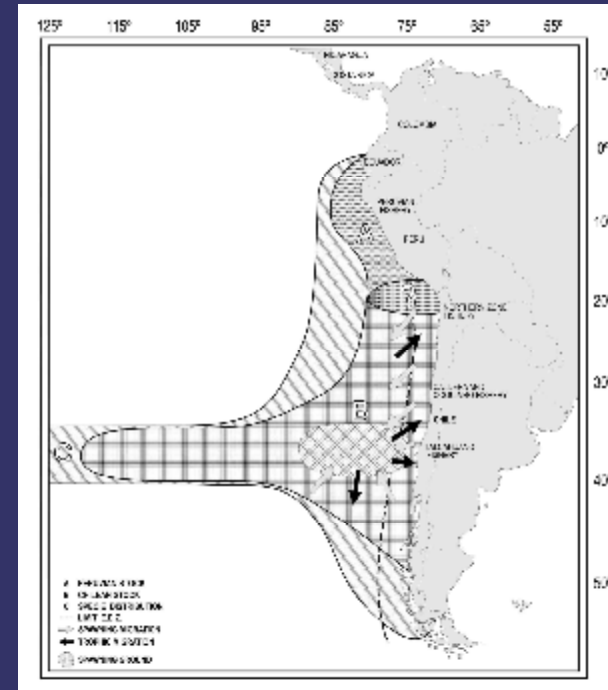
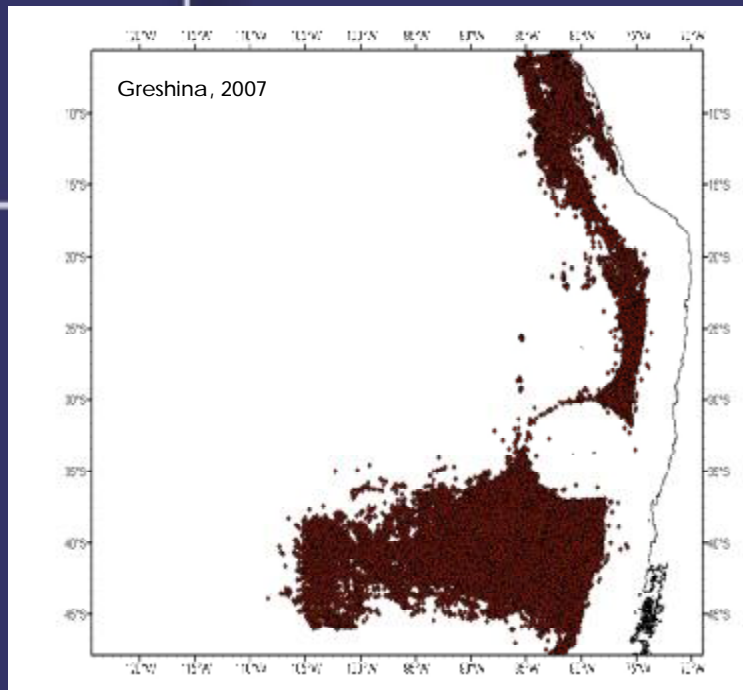


Nesterov, 2007



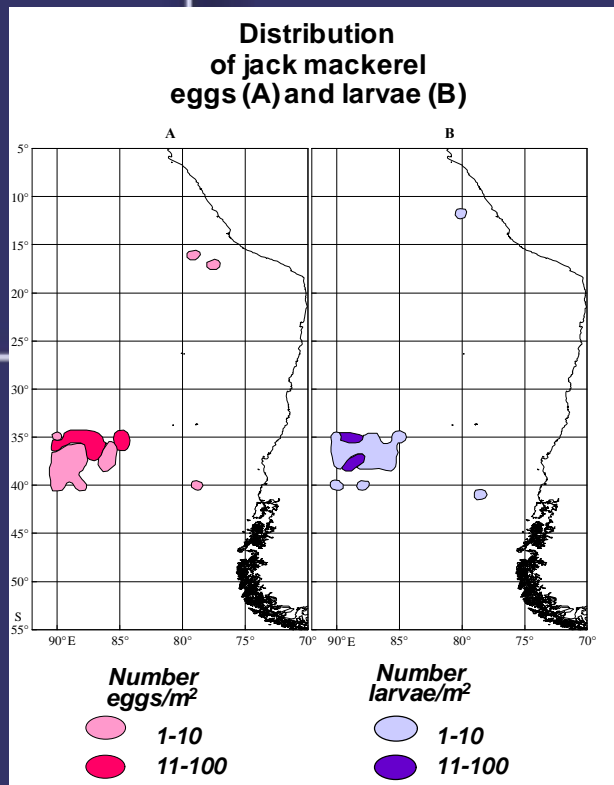
Chilean jack mackerel stock

Several complementary researches made by Chile, has allowed concluding that, at least in the current and historical operating area of the national and foreign fleets in the area adjacent to the EEZ, the fishery is supported by a single stock, named "Chilean jack mackerel stock"



Chilean jack mackerel stock: spawn area, parasites and DNA studies

The most important spawning ground is found off central Chile. In addition, some studies also show the existence of another spawning zone off Peru.



Nesterov, 2007

Oliva, 1999:

There are significant differences between of the parasites in the jack mackerel caught from Callao (Peru) to the north with the one caught along the Chilean coast.

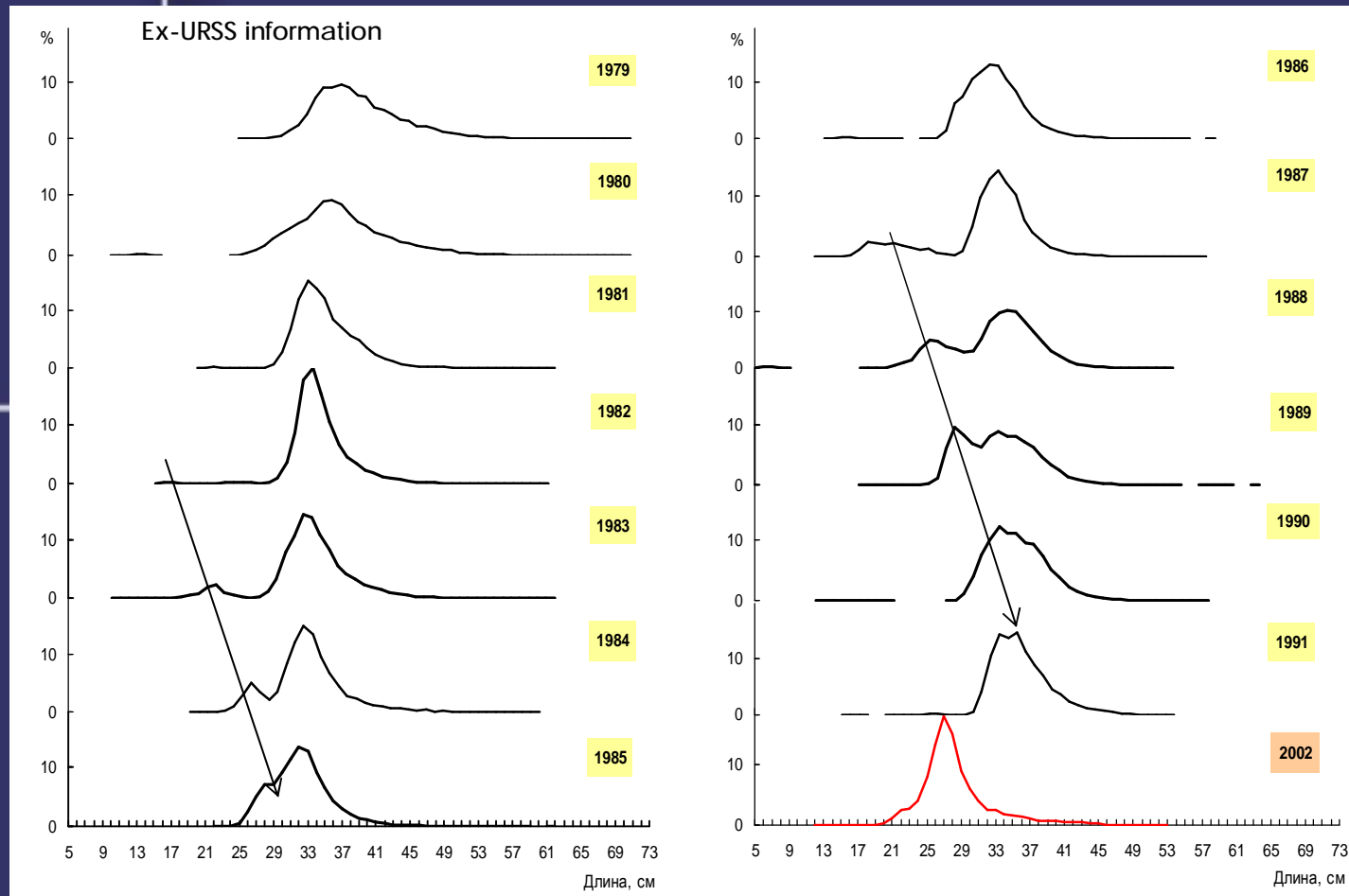
Cardenas et al, 2005:

Analyses of the mitochondrial DNA of individual specimens collected off Chile (Iquique and Valdivia) and New Zealand (Tauranga), found no genetic differences among the samples analyzed.



Chilean jack mackerel stock: some fundamentals

Similarity between the catch-at-length frequencies registered by the Chilean fleet (inside ZEE), and the ex-URSS fleet

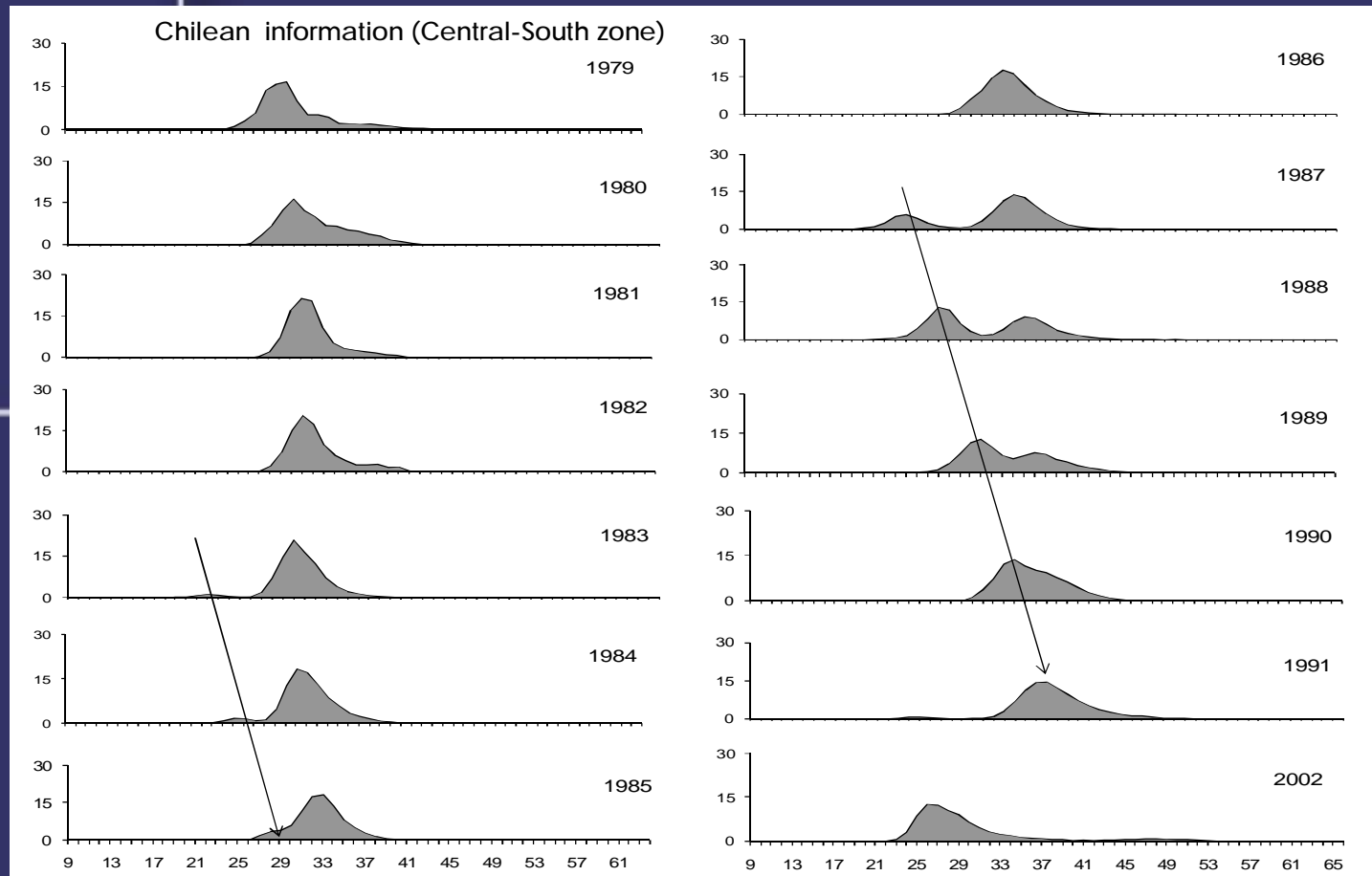


Nesterov, 2007



Chilean jack mackerel stock: some fundamentals

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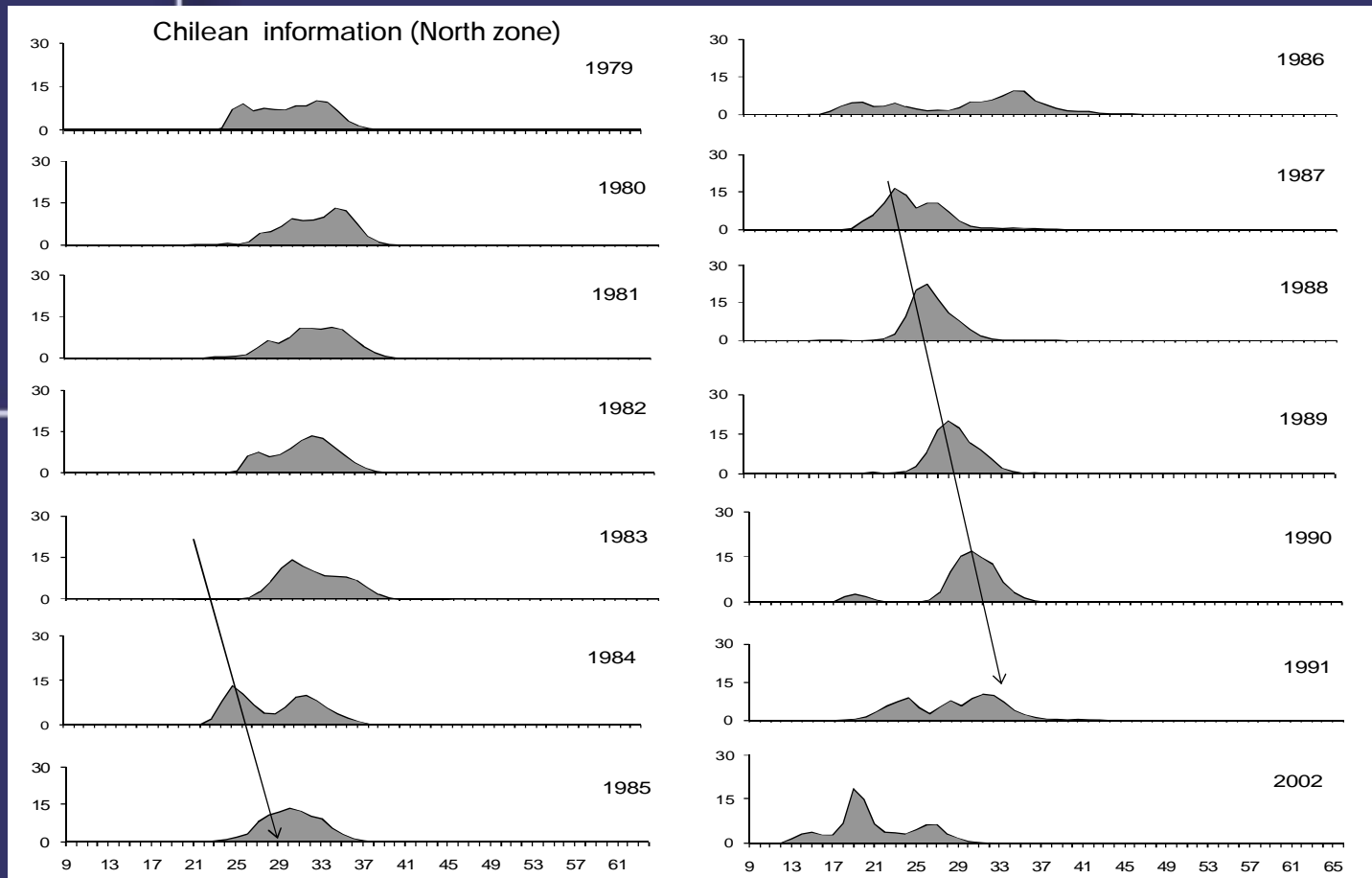


Source: IFOP



Chilean jack mackerel stock: some fundamentals

Similarity between the catch-at-length frequencies registered by the Chilean fleet (inside ZEE), and the ex-URSS fleet



Source: IFOP



Conclusions

Current knowledge on jack mackerel allows stating that jack mackerel fished inside and outside the Chilean EEZ is a biologically self sustained single stock. Evidence supporting this conclusion is based on the following:

1. Marked seasonality of the fishery inside and outside the Chilean EEZ, as a result of migration to the high seas for reproduction and subsequent trophic immigration towards the coast.
2. Main spawning ground located off the center area of Chile, a process that begins inside the EEZ and extends towards the high seas.
3. Main nursery grounds located in the north of Chile and inside the Chilean EEZ.



Conclusions

4. Similarity in the size composition of catches by different fleets operating inside and outside the Chilean EEZ
5. Genetic convergence of specimens taken from inside and outside the Chilean EEZ, as shown by DNA studies.

