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ANNUAL NATIONAL REPORT TO THE SPRFMO SCIENCE WORKING GROUP.

JACK MACKEREL FISHERY IN CHILE

GOVERNMENT OF CHILE

Undersecretariat for Fisheries.

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1. DESCRIPTION OF THE FISHERY

1.1 Composition of the Fleet

Over the last five years, the size of the fleet authorized to fish for jack mackerel in the EEZ and in the high seas, as well as its structure has remained stable. Close to 135 vessels have remained in operation, most of which are vessels with a hold capacity ranging between 300-600 m3 to 900-1200 m3 (Table I).

The size of this fleet authorized as remained constant at around 288 vessels during the last five years. No major interannual variations are observed, and most vessels have a hold capacity ranging from 300-600 m3 to 600-900 m3 (Table II).

Table I. Number of vessels operating on jack mackerel in high seas and the EEZ with purse seine nets, per year and hold stratum, 2004-2008.

Years	Total.	Nº of vessels per hold stratum (m3)						
		0-300	300-600	600-900	900-1200	1200-1500	1500-1800	1800-2100
2004	142	19	71	9	21	10	10	2
2005	143	18	75	8	21	9	10	2
2006	135	14	69	9	20	9	10	4
2007	131	12	66	10	19	9	10	5
2008	126	8	65	9	19	10	10	5

Source: Undersecretariat for Fisheries

Table II Number of vessels authorized to operate on jack mackerel (Chilean jack mackerel regime applied to the Chilean fishery), per hold stratum, 2004-2008.

Years	Total	Nº of vessels per hold stratum (m3.)						
		0-300	300-600	600-900	900-1200	1200-1500	1500-1800	1800-2100
2004	307	76	118	52	35	13	10	3
2005	289	68	113	46	36	14	9	3
2006	286	63	114	47	36	13	10	3
2007	284	61	115	46	35	13	10	4
2008	282	60	115	44	34	15	10	4

Source: Undersecretariat for Fisheries

1.2 Catches per Year and Area.

Over the last 5 years, the annual jack mackerel catches show a progressive decline from 2004 to 2007, with volumes that dropped from 1.45 to 1.3 million t. In 2008 this trend became more evident reaching 896 thousand tons.

This trend is specifically observed in catches recorded by the fleet operating between 24°14´ 28 and 43°44´28 LS, while the fleet operating north to this area has maintained catch volumes (Table III).

Table III.. Jack mackerel catches inside and outside the EEZ with purse seine nets, per area and year, 2004-2008

Years	Total Catches(t)	Catches per area (t)	
		North boundary - 24°14´ 28 L.S.	24°14´ 28 - 43°44´28 L.S.
2004	1.451.599	158.656	1.292.943
2005	1.430.434	168.383	1.262.051
2006	1.379.941	155.256	1.224.685
2007	1.302.784	172.701	1.130.083
2008	896.108	167.258	728.850

Source: National Fisheries Service Statistical Yearbook

1.3 Significant changes in the fishery.

a. Reduction of the fleet

Historical changes experienced by the fleet operating in the central-southern zone are highly relevant as they explain the high volumes of jack mackerel catches.

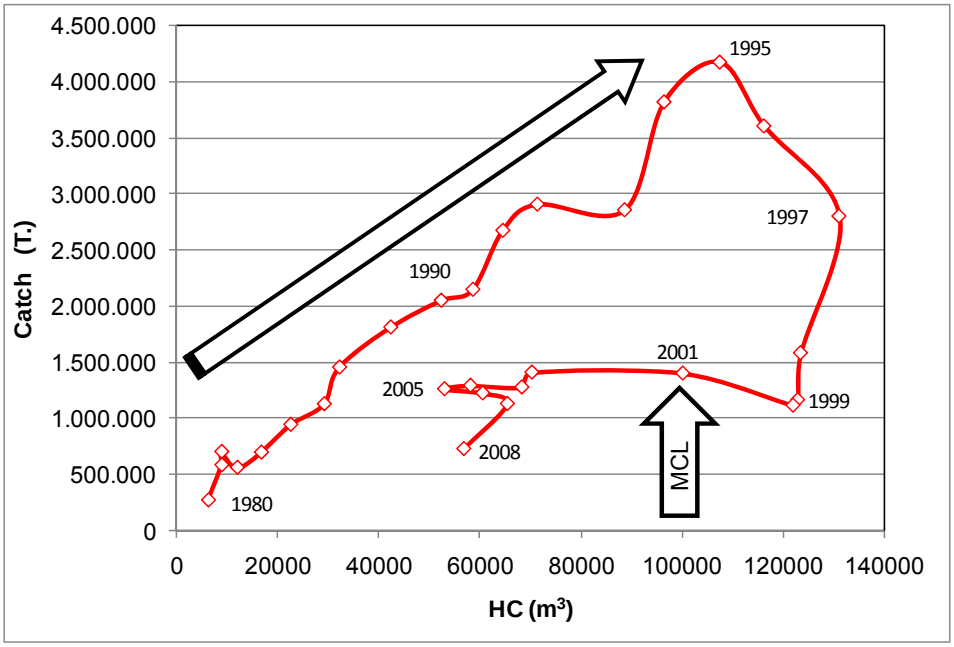
One of the most important changes of the fleet is an adjustment period from 1998 to 2002, which led to an important reduction both in the number of vessels (-66%), and the hold accumulated capacity (-46%), despite the increase in average hold capacity (56%), as a result of the introduction of larger vessels.

It is worth mentioning that this important contraction of the fleet is linked to the reduction in abundance and as a result, catches of jack mackerel, and the implementation of management measures aimed at protecting the species; such as closures, global quotas and research fishing activities.

b.- Establishment of the Annual Catch Global Quota and the Maximum Catch Limit by Shipowner (MCLs).

The resource showed a positive response to the implementation of additional management measures during the above described adjustment period, and a lower biomass. This proves that prohibition of new entries to the fleet was not sufficient to maintain a sustainable biomass in the fishery.

This information is used to establish the Maximum Catch Limit regime in 2001. This allocation system allowed the fleet to conclude its adjustment process and begin a period of stability in 2002, increasing the economic efficiency of the operation (Table 1).



Source: Undersecretariat for Fisheries

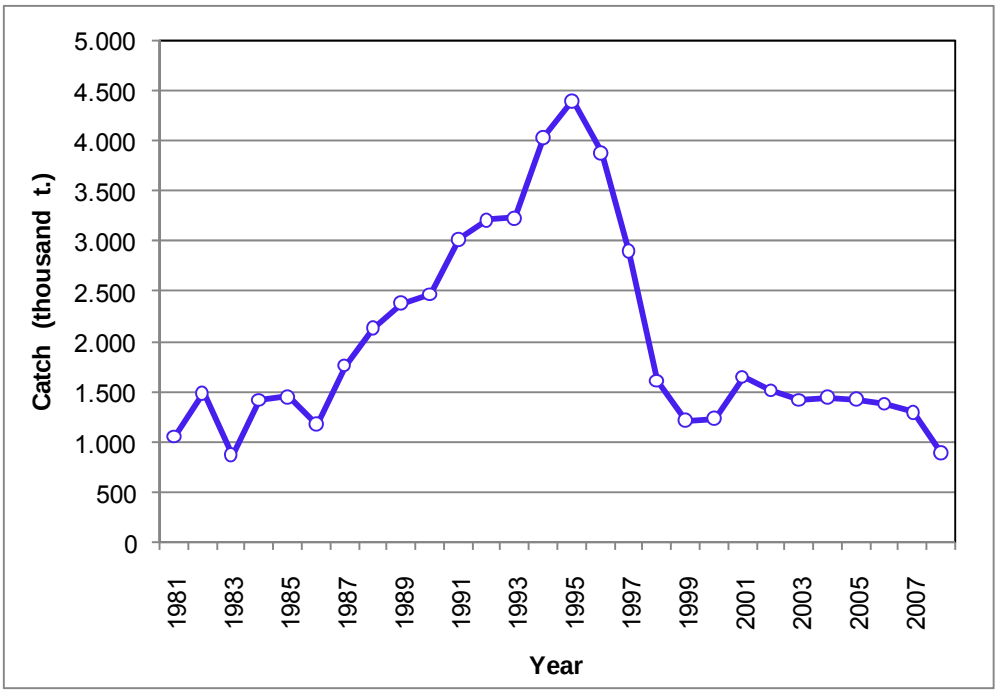
Table 1. Catches and accumulated hold capacity (HC) of the purseine fleet that operates on jack mackerel in the Central Southern zone, 1980-2008.

2. CATCHES, EFFORTS AND CPUE IN THE JACK MACKEREL FISHERY.

2.1 Trends in catches.

At the beginning of the jack mackerel fishery, catches displayed a growing trend until 1995, reaching 4,4 million tons, dropping to 1,2 million tons in 1999. From 2001, catch volumes remained stable at 1.4 million tons, as a result of the implementation of new management measures such as the Maximum Catch Limit.

Finally, at the end of the period, a progressive decline in catches is observed (Table 2).



Source: IFOP-SERNAPESCA

Table 2: Total catch of jack mackerel with purseine 1981-2008 period.

Currently, by-catch estimations related to the jack mackerel fishery are not available. Although the species associated to these catches are recorded and classified by frequency as main and incidental associated species, as shown in tables IV and V, respectively.

Table IV. Main species related to catches of jack mackerel with purseine fishing gear.

COMMON NAME	SCIENTIFIC NAME
Chub Mackerel	*Scomber japonicus*
Patagonian Grenadier	*Macruronus magellanicus*
Araucanian Herring	*Strangomera bentincki*
Peruvian Anchovy	*Engraulis ringens*

Fuente: IFOP.

Table V. Incidental species associated to jack mackerel catches made with purseine fishing gear.

COMMON NAME	SCIENTIFIC NAME
Atlantic Saury	*Scomberesox saurus*
Mote Sculpin	*Normanichthys crockeri*
Eastern Pacific Bonito	*Sarda chilensis*
White Warehou	*Seriolella caerulea*
Palm Ruff	*Seriolella violacea*
Common Dolphinfish	*Coryphaena hippurus*
Jumbo Squid	*Dosidicus gigas*
Pacific Menhaden	*Ethmidium maculatum*
South Pacific Hake	*Merluccius gayi*
Starry Butterfish	*Stromateus stellatus*
Parona Leatherjacket	*Parona signata*
Roncacho	*Sciaena spp.*
South American Pilchard	*Sardinops sagax*

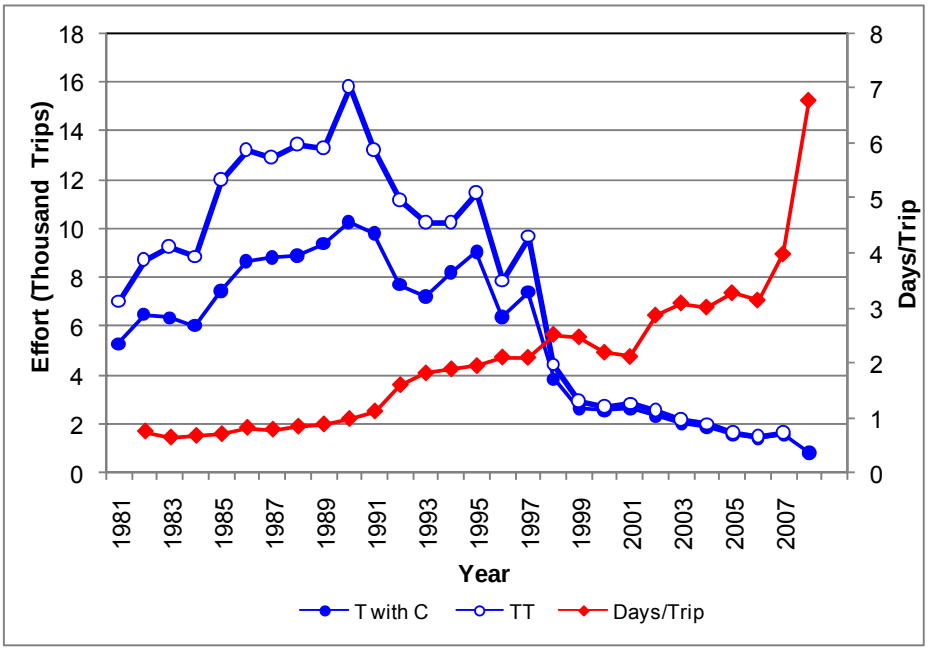
Source: IFOP.

2.2 Fisheries effort trends.

The description of the fisheries effort only considers the data related to the fleet that operates in the central southern zone, since it is the only fleet that captures jack mackerel as the main target species.

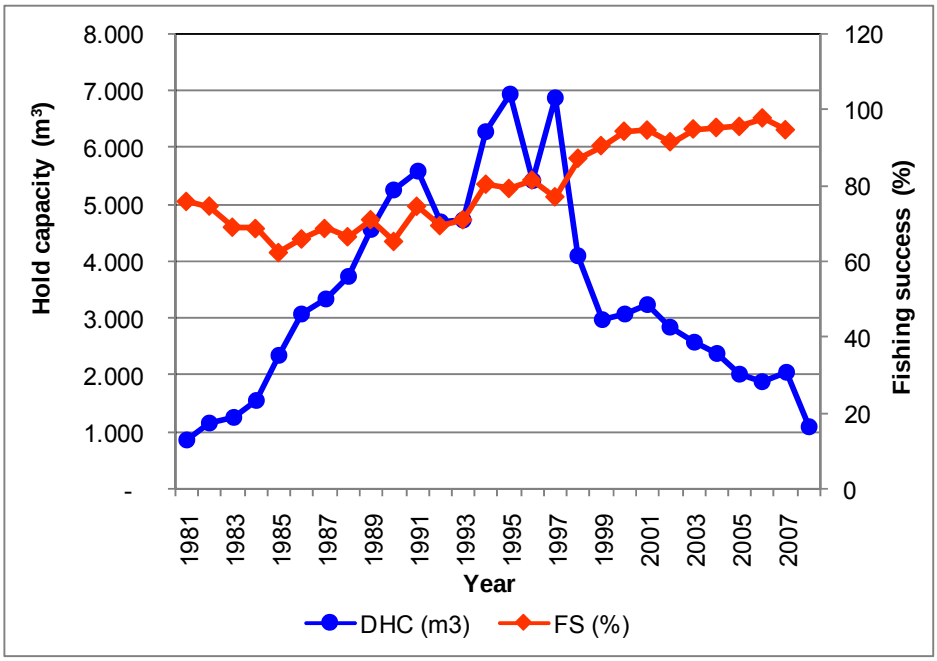
The performance of the fleet shows a progressive increase in the duration of fishing trips. In 2008, fishing trips lasted an average of 7 days. This change is due to the fact that vessels have moved away from the fishing zone, causing a fall in the fishing effort measured by the number of fishing trips, total trips and hold capacity in m^3 (Tables 3 y 4).

Nevertheless, as a result of the implementation of management measures related to the jack mackerel crisis and Maximum Catch Limits, in recent years the fleet has displayed a high level of efficiency, around 95%. This efficiency is measured on the basis of the ratio of fishing trips over the total number of trips (Table 4).



Source:IFOP

Table 3: Number of fishing trips (T with C), total trips (TT) and duration of fishing trips during purseine operations in the central southern zone, 1981-2008 period.

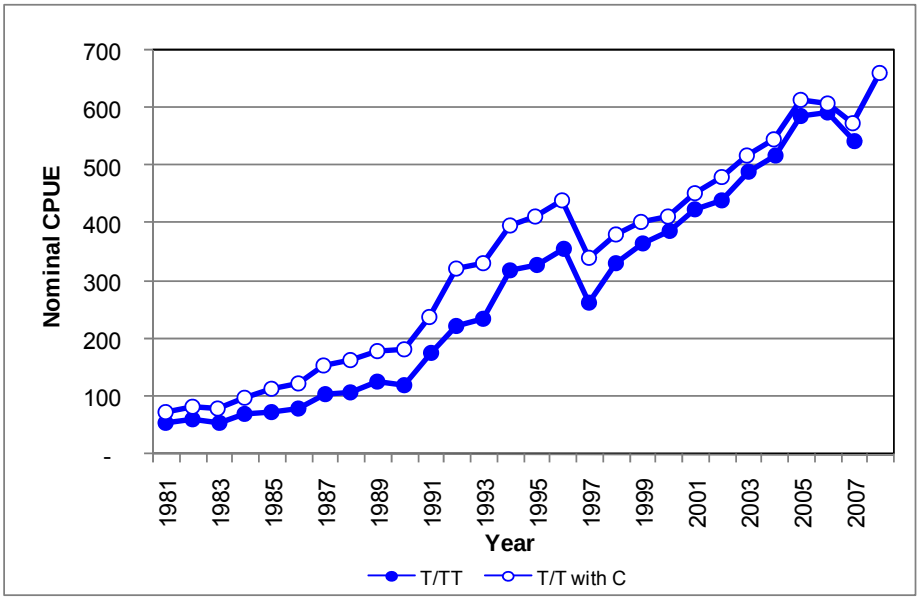


Source:IFOP

Table 4: Displaced hold capacity (DHC) and success expressed in percentages (FS) of the purseine fleet in the central southern zone, 1981-2008 period.

2.3 CPUE trends .

Two indicators describe the nominal CPUE of the central southern fleet: tons per fishing trip and tons per total trips. In general, both indicators show a growing trend; nevertheless, as indicated in paper # 10 CHJMWS and in the document Fisheries Indicators submitted by Chile at the VIII Meeting of the Science Working Group (SWG), it is not possible to use this index as a relative abundance indicator (Table 5).



Source:IFOP

Table 5. nominal CPUE; tons of jack mackerel by total trips (T/TT) and tons of jack mackerel by fishing trips (T/T with C), using perseine gear, 1981-2008 period.

3. RESEARCH ACTIVITIES AND DATA COLLECTION.

3.1.- Research activities and data collection[1].

In view of the crucial importance of the jack mackerel fishery, Chile conducts intensive monitoring of the status of this stock since the 1980's. This involves collecting biological and fishing data, conducting fishing surveys, building indicators of reproductive success and indicators of oceanographic conditions so as to integrate all the scientific data and conduct a full annual assessment of the stock to develop a status diagnosis.
The annual research program includes the following projects:

[1] For further details refer to paper CHJMW # 24, "Research and management of Chilean Jack Mackerel (*Trachurus murphyi*) exploited in the South East Pacific Ocean" or SPRFMO –III –SWG-18

- Monitoring of pelagic fishing activities in the north and central-southern areas of Chile by collecting and analyzing biological, fishing and commercial data on the main pelagic resources.

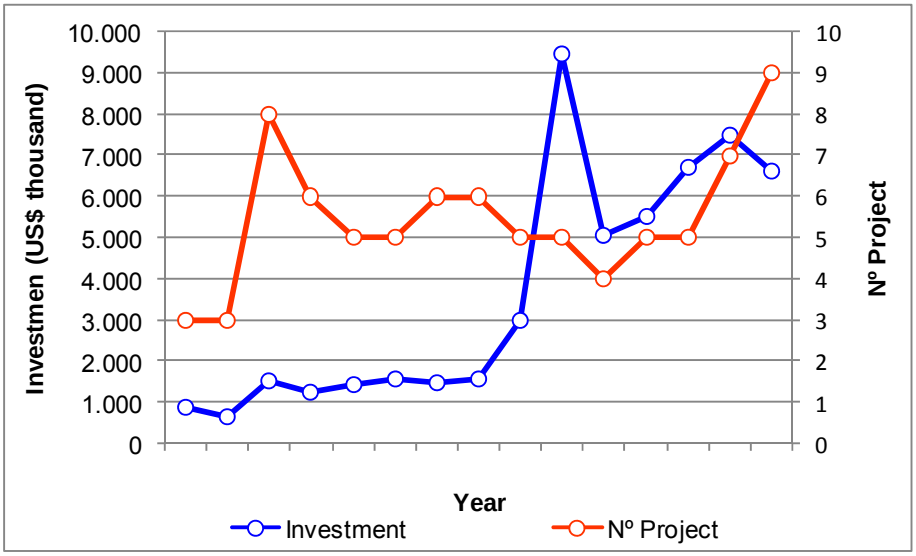
- Hydro-acoustic assessment of jack mackerel from regions XV to II and V to X, to obtain a quantification of the biomass of jack mackerel through direct methods.

- Biological condition of jack mackerel on the high seas, in order to estimate abundance indexes of jack mackerel eggs and larvae during peak reproductive activity periods.

- Stock assessment and estimates of total allowable catch (TAC): Diagnosis of the exploitation status of the resource and establishment of its TAC.

It is important to note that this research is conducted with government funding and it is considered key in the management of the jack mackerel fishery. This strategic research is complemented by other short term studies in areas of specific interest.

Total investment in jack mackerel research from 1993 to 2007, reaches US $54 million, totaling 82 projects; this implies an annual average amount of US $3,6 million, and an increasing investment in recent years (Table 6).

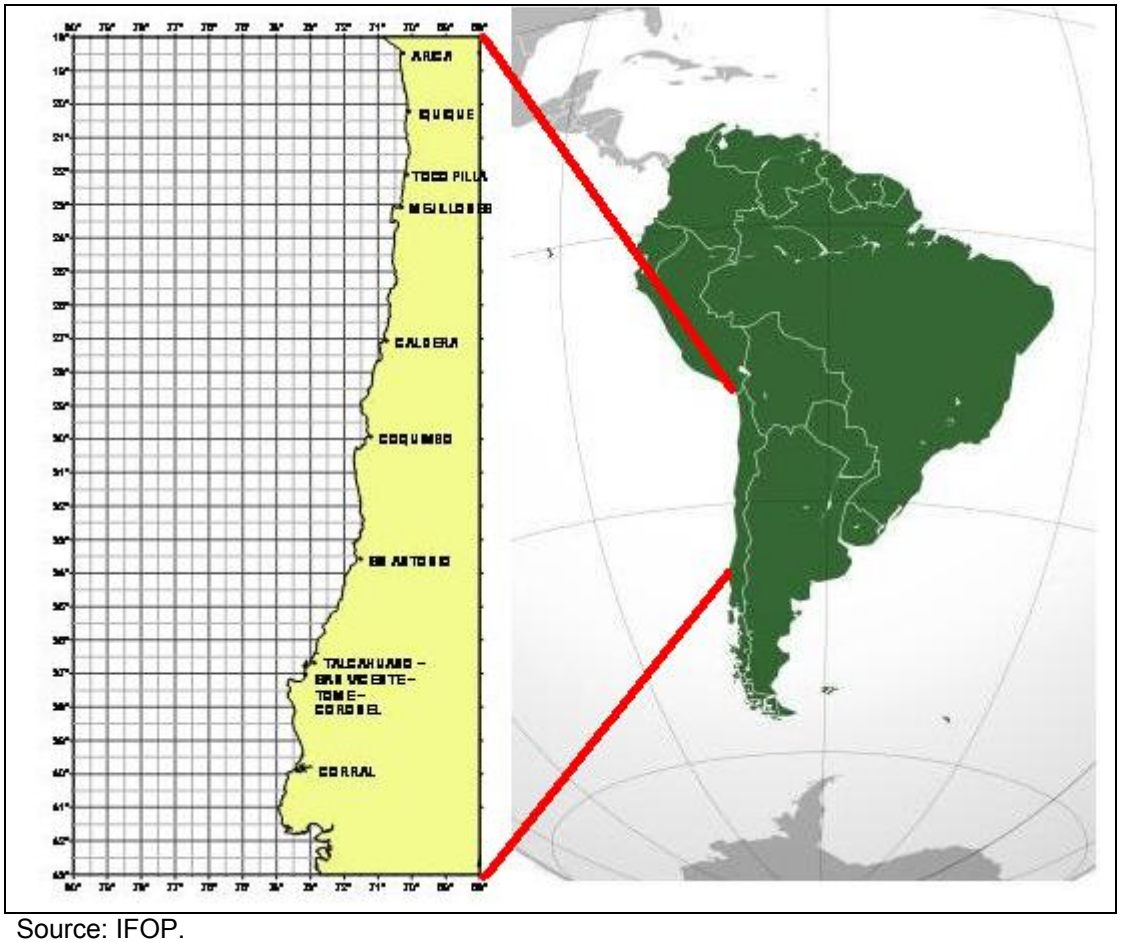


Source:Undersecretariat for Fisheries

Table 6. Investment (US$) in research and number of projects related to jack mackerel.

a.- Monitoring of Jack Mackerel Fishery.

In pelagic fisheries, sampling efforts are aimed at two major areas of fishing activities in Chile: the north, covering the area that extends from Chile's northern border and parallel 32°10'S (Regions XV through IV); and the central-southern area, from parallels 32º10'S to 43º30'S. On a national level, these are the main fishing areas for jack mackerel. A permanent data collecting and sampling network operates across the main landing sites (Table 7). Biological data is also collected on board fishing vessels by scientific observers.



Source: IFOP.

Table 7. Sampling sites for Jack Mackerel nation wide.

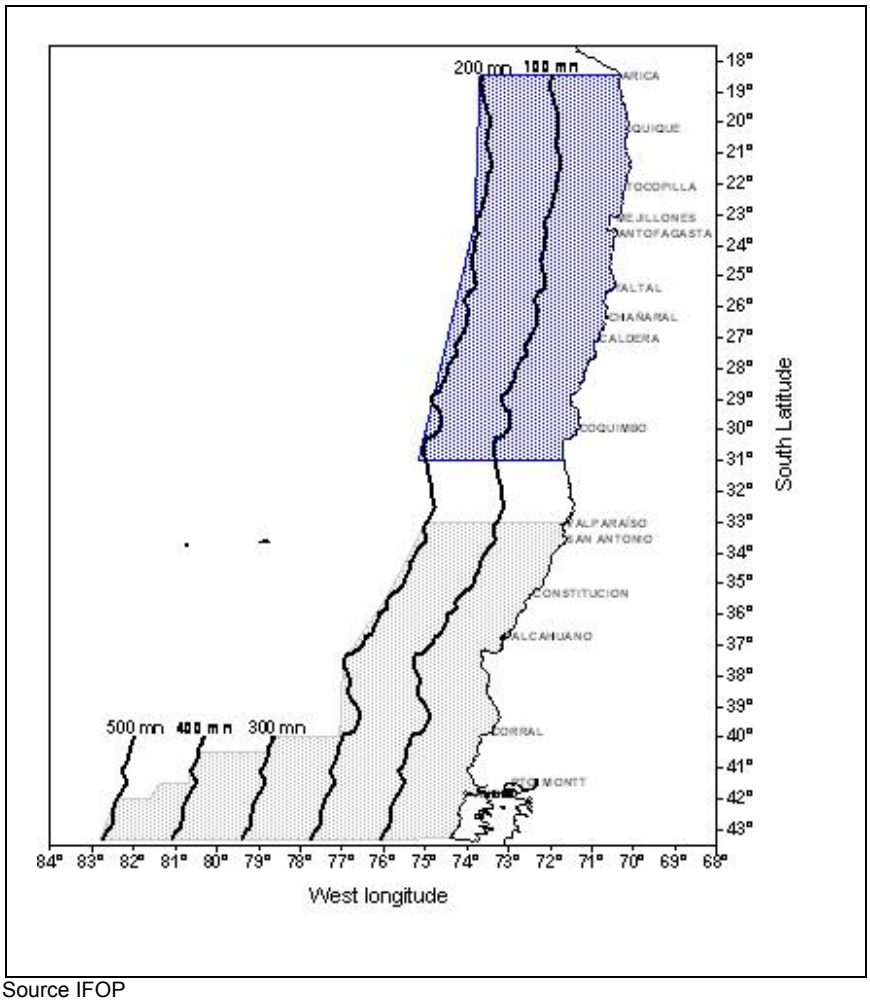
Data collection from the fleet includes updates on the technical features of the vessels as well as information on operational variables. A daily record is kept of the fishing operations by each vessel. Thus, data is collected on landings (by date, time, port and species), catches (by zone and/or coordinates and species) and fishing effort in terms of the trips made (total trips, with or without catch). Biological data is also collected: such as size, total weight, eviscerated weight, gonad weight, state of sexual maturity and otolith extraction.

b.- Acoustic surveys.

Since 1980, the Chilean State has conducted fisheries surveys in the area of distribution of main pelagic resources: *Trachurus murphyi, Engraulis ringens* and Sardinops sagax. These studies are aimed at estimating abundance, spatial distribution and age composition of the stocks assessed with acoustic systems (ecointegration). The studies also determine the biological and oceanographic conditions prevailing in surveyed areas.

In the 1980-1990 period, fisheries surveys focused on the north of Chile, covering the area extending from Chile's northern border and parallel 30°00'S, up to a maximum distance of 200 nautical miles from the coast. As of 1991, as a result of the significance of the jack mackerel fishery in the central and southern area, the fisheries survey program included ─on a regular basis─ the area ranging from parallel 33°00'S to parallel 42°00'S.

However, as of 2003, together with acoustics surveys and fishing explorations, the area under study has focused on the distribution of jack mackerel. This has meant increasing the coverage up to 43° S.L. and a distance over 500 nautical miles from the coast. Transect sampling was employed in a general east-westward direction, separated by distances varying from 10 to 30 nautical miles (Table 8). In 2008 transects extended up to approximately 500 nm from the coast and to 44° S.L.



Source IFOP

Table 8: Jack mackerel areas surveyed in Chile, 1981 – 2008

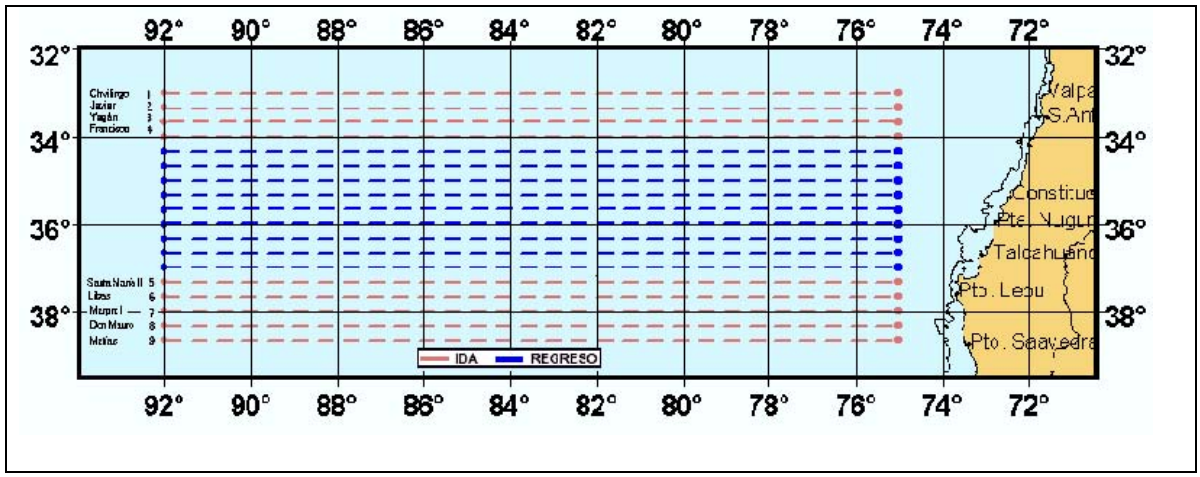
c.- Monitoring of the reproductive status.

Chile began to monitor reproductive status of Chilean jack mackerel in 1997. Monitoring is used to estimate the relative abundance index of jack mackerel eggs and larvae in the central southern area of Chile and thus characterize reproductive aggregations in time and space. The results of this program provide relative estimates of the spawning biomass using the Daily Egg Production Method (DEPM) (Lasker, 1985). The spawning biomass thus estimated is used as a calibration index for stock assessment.

The monitoring program is conducted simultaneously and synoptically (8 days) both inside and outside the EEZ up to a distance of 1000 nautical miles (meridian 92ºW). The sampling area and the period are determined by considering, as a scientific premise, that the extension and location of the spawning nuclei are determined primarily by the distribution of water masses with temperatures typically ranging from 15° to 19°C. These masses show inter-annual latitudinal

shifts depending on the occurrence of cold or warm periods, or the enhancement or weakening of the West Wind Drift.

Surveys are carried out in the second half of November (i.e. the period of highest reproductive activity). The area extends over a quadrant defined by parallels 31°40'S and 38°S and meridians 75°W and 92°W. Ten to twelve fishing vessels are used to perform 20 transects perpendicular to the coast separated by a distance of 20 nautical miles (n.m.) (Table 9). Samples are taken along transects every 18 n.m. In total, the study collects samples of ichthyoplankton in over 700 oceanographic stations in the area under analysis.



Source: INPESCA.

Table 9: Transect sampling system used in surveys to monitor Chilean jack mackerel reproductive conditions

d.- Stock assessment.

Chilean jack mackerel stock is assessed by IFOP using a statistical catch-at-age model based on a Bayesian estimate approach (Fournier and Archibald, 1982: Deriso et al., 1985; Hilborn, 1990b; McAllister and Ianelli, 1997, Maunder et al., 2000; Hilborn et al., 2003; Ianelli and Lamberson, 2003). The advantage of this methodological approach is its flexibility to include different types of information, test hypotheses and evaluate the implications of different uncertainties.

The model uses data collected from the fishery as of 1975. Fishing inside and outside the EEZ is considered; as to the latter, the catch of the former URSS fleet from 1979 to 1992, and the People's Republic of China is also included. The relevant information considered in the analysis include the age composition of the catches by zone or fleet, landings, and series of indicators such as the biomass obtained through hydro-acoustic surveys and spawning biomass using the DEPM.

3.2 Other research activities.

One of the relevant studies concerning jack mackerel is within the framework of the Project entitled “Study on the migration of jack mackerel in Chile, Phase I”, aimed at studying the population structure of jack mackerel in the South Pacific and put forth a migration study design.

The development of this study included sample analysis from Peru, New Zealand and Chile, and considers the use of various methods such as genetic analysis (DNA), parasites, body and otolite morphology and patters of natural history.

The final results of this Project are not yet available since the study has been repeated in order to ratify the stability through time of the indicators.

4. BIOLOGICAL SAMPLING AND LENGTH AND AGE COMPOSITION OF CATCHES.

4.1 Biological sampling[2].

Biological information is obtained from the simples of the target species (jack mackerel) and by-catch. Samples are taken on a daily basis, mainly in landing sites and the data is supported by the information collected by on board observers.

This activity implies measuring jaw fork length, otolith extraction, total weight, eviscerated weight and gonad weight, sex determination and sexual maturity of each individual.

Simples are taken across Chile. The most important ports are Iquique, in the north and San Vicente and Coronel in the central southern zone. During the last five years, 469.111 length measurements have been made, and a total of 51.527 otoliths have been extracted (Tables IV and V). Additionally, 89.099 records of weight, sex and state of maturity have been made (Tabla VI).

[2] For further details please refer to paper SPRFMO-V-D&IWG; “Brief description of the jack mackerel sampling in the Chilean fisheries”.

Table IV. Number of individuals sampled on the basis of length, by landing port, IFOP, 2004 – 2008 period.

Port	2004	2005	2006	2007	2008
Arica	1.417	4.634	7.603	8.120	4.257
Iquique	16.911	32.857	33.225	25.778	21.130
Tocopilla	5.438	4.141	3.096	4.129	14.446
Mejillones	11.972	5.705	2.705	3.374	
Caldera	9.983	10.589	10.342	6.263	7.189
Coquimbo	5.760	1.188	1.737	6.299	4.154
Talcahuano.	5.398	9.340	5.258	2.407	191
San Vicente	27.457	25.527	26.709	30.469	12.849
Coronel.	4.870	2.687	6.579	11.764	12.641
Corral	3.818	1.835	2.347	1.787	736
Total	**93.024**	**98.503**	**99.601**	**100.390**	**77.593**

Table V. Number of otoliths collected by IFOP by landing port, 2004 -2008.

Port	2004	2005	2006	2007	2008
Arica	70	187	909	209	351
Iquique	336	1.283	888	1.129	1.194
Tocopilla	156	374	84	193	378
Mejillones	108	108	176	195	
Caldera	1.046	425	945	528	1.065
Coquimbo	823	441	790	857	1.306
Talcahuano.	5.665	4.349	0	38	3.690
San Vicente	0	0	4.109	3.265	-
Coronel.	1.650	525	1.752	2.790	3.726
Corral	1.299	611	522	352	330
Total	**11.153**	**8.303**	**10.175**	**9.556**	**12.040**

Table VI: Number of samples to determine weight, sex, sexual maturity, by port of landings, taken by IFOP, 2004 - 2008.

Port	2004	2005	2006	2007	2008
Arica	169	50	233	347	678
Iquique	2.499	2.049	1.534	5.133	3.243
Tocopilla	646	123	153	487	2.017
Mejillones	633	545	538	426	
Caldera	3.305	1.118	2.069	1.687	1.986
Coquimbo	2.878	728	860	2.176	1.786
Talcahuano.	1.484	820	631	572	80
San Vicente	11.611	6.147	3.555	5.009	290
Coronel.	970	601	2.131	4.404	6.494
Corral	1.809	889	761	485	260
Total	**26.004**	**13.070**	**12.465**	**20.726**	**16.834**

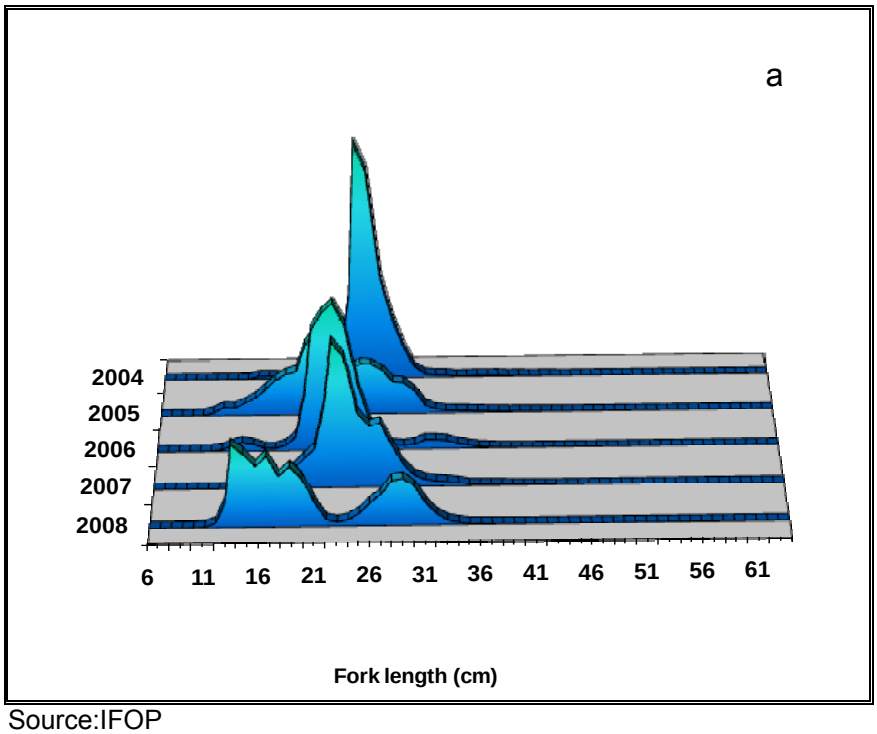
4.2 Length and age composition of catches.

a.- Size Composition.

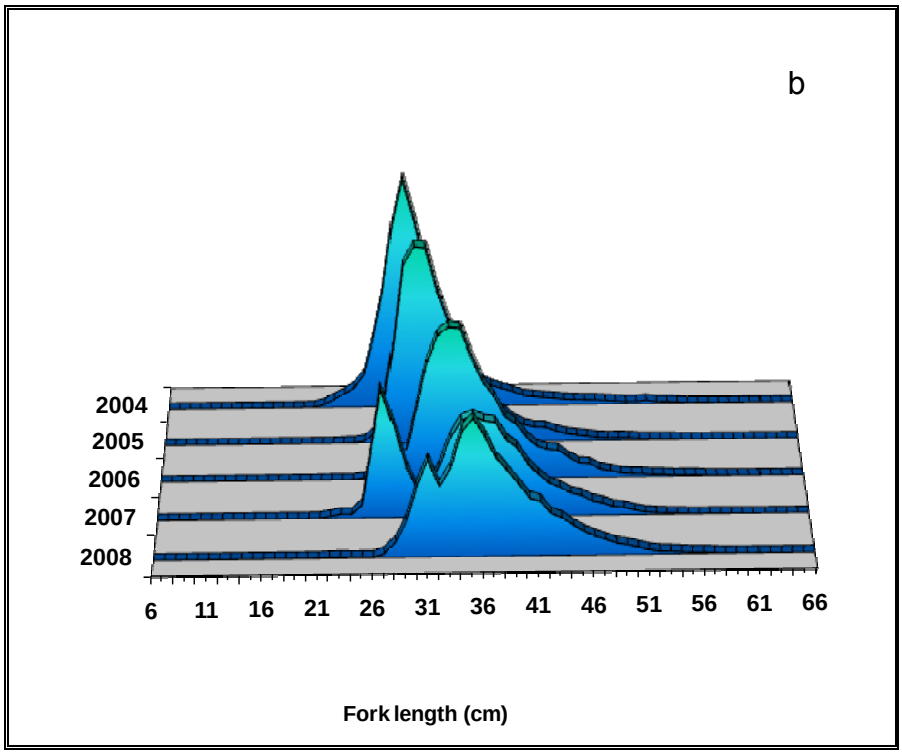
The size structure of jack mackerel catches in the north show a displacement of more recent annual classes; thus the 21 cm. mode FL. observed in 2005 was at 29 cm in 2008, and an important presence of juveniles that same year (Table 10 a).

On the other hand, catches in the central southern zone show a continuous shift of the mode toward larger sizes during the last five years. In 2004 the main mode was at 29 cm. FL and continue to be sustained by the same cohort, at a mode ranging from 35-36 cm. FL. in 2008 (Table 10b).

This shift shows that the population is aging on account of the weak recruitments in the last 6 years.



Source:IFOP



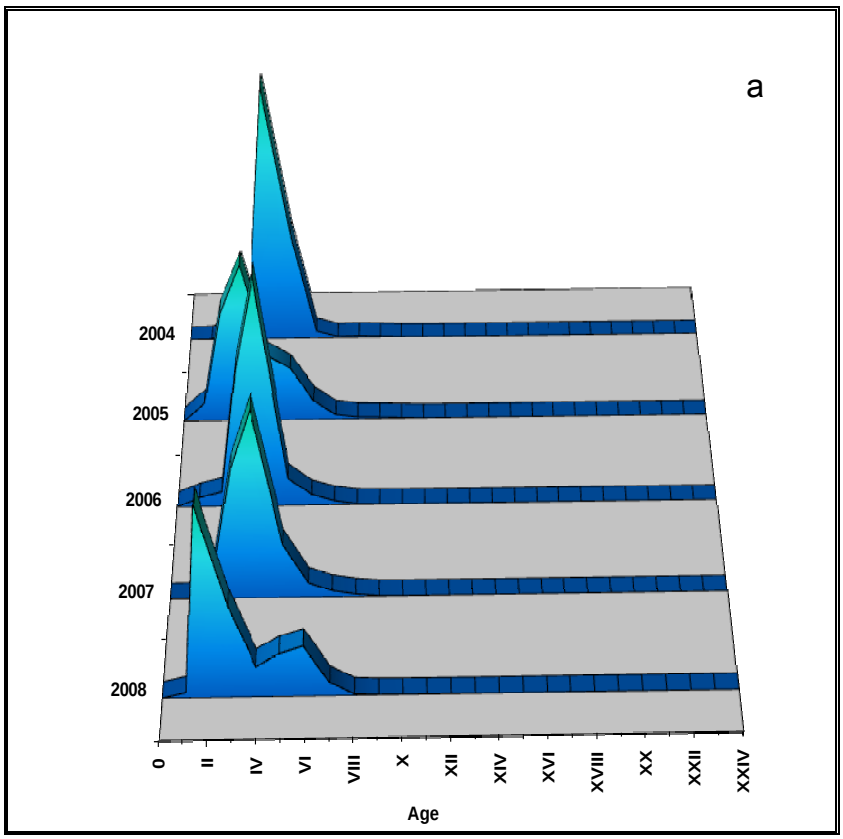
Source:IFOP

Table 10: Size structure of jack mackerel catches in percentages. a) Northern Zone Fishery; b) Southern zone fishery, 2004-2008 period.

b.- Age composition.

The age structure of catches in the northern zone show a stable distribution centered on individuals at ages III and IV modes (Table11a).

On the other hand, the age structures of the catches in the central southern zone show a shift similar to the one observed in the size composition, with modes at age V in 2004, shifting to age VII-VIII in 2008. This is the highest mode in recent years, which substantiates the ageing of the population (Table 11 b).



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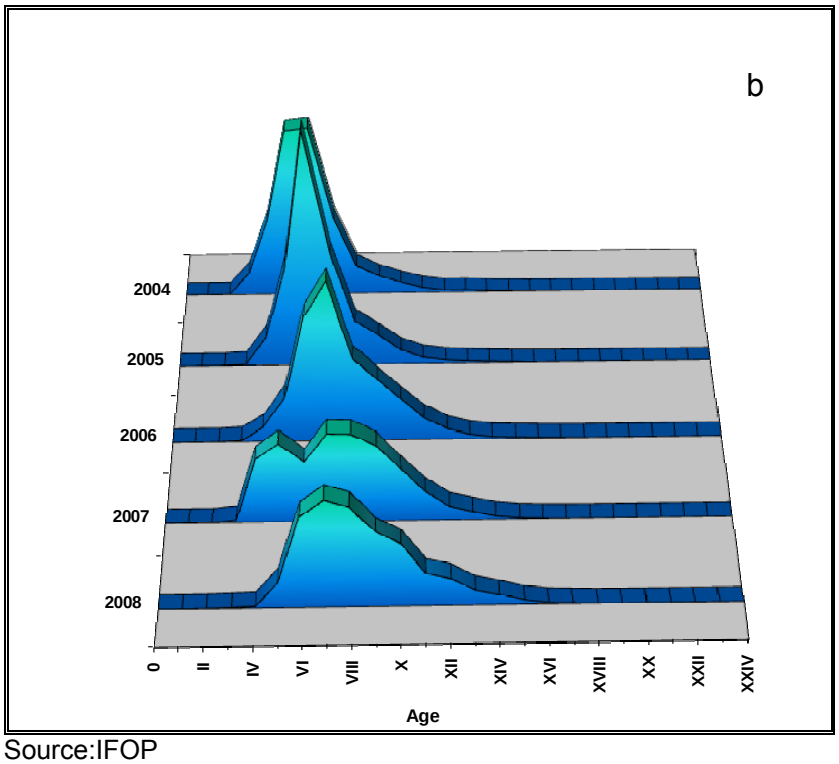

Source:IFOP

Table 11: Age structure of jack mackerel catches in percentages a) Northern Zone Fishery b) Southern Zone Fishery, 2004-2008 period.

5. PORT OBSERVER AND SAMPLING PROGRAM.

The port observer and sampling program was briefly described under item 3.1.a, entitled “Monitoring of the jack mackerel fishery”. The following progress has been made in recent years within the framework of this program:

- Implementation of the computer technology platform that sustains the data production system. This system implies the use of a Pocket PC that allows samplers and observers to enter and transmit electronic data.

- Implementation of a ISO 9001:2000 Quality Management System applied to the collection, validation, transmission and storage of data, that allows records to be made with a minimum of quantified and traceable errors.

- Training of observers on basic instructions, theory and practice on the data collection process on board fishing vessels and specific training courses aimed at enhancing their knowledge on the fishery and the biology of the resource.

- Development of a scientific observation program aimed at enhancing the knowledge on the relationship between fishing and the marine ecosystem, to increase awareness of the by-catch issue during fishing operations targeting various resources.

- Regarding coverage of the sampling program, the following must be noted:

  - Chile has a comprehensive scientific observation program, based on the collection and organization of data resulting from its port-sampling system and on board monitoring of fishing activities.

  - Historically, the research undertaken by Chile on pelagic resources has been based on data collection at port, which has maintained a coverage level of 7% for the Chilean jack mackerel fishery, and 9,6% for Chub mackerel, measured in number of trips sampled with respect to the number of total trips in these fisheries. If the level (amount) of catch from which the samples are extracted is calculated, in relation to the level of total catch, then the coverage reaches 24.5% in the case of Chilean jack mackerel, and 17.2% for chub mackerel. These differences arise because a fishing trip is considered to be any fishing activity with record of the species, regardless of whether it is a target species or not; this implies an overrating of the total trips.

  - Recognizing that data collection at port cannot completely and accurately describe all the fishing activities, Chile promoted the implementation of the system of scientific observer on board. Data collection through this system is recent, starting only in 2008. Currently, coverage levels for this program reach 3.1%, measured in number of trips, 7.7%, measured in number of vessels sampled, and 6.6%, measured as a proportion of catches with sampling record.

  - In Chile' s view, the level (%) of coverage is not a suitable criterion to measure the efficiency of scientific observation, since the relevant goal of sampling designs has been to maintain an acceptable statistical significance for assessment models.

6. IMPLEMENTATION OF MANAGEMENT RECOMMENDATIONS[3].

6.1 Biological measures.

In 1980, jack mackerel landings made by the Chilean fleet began to increase noticeably. Therefore, the fisheries Authority adopted the first management measure for this resource, establishing a minimum size at capture of 26 cm. fork length[4]. A margin of tolerance for undersized catches was established at 20% measured in weight[5]; this was subsequently changed to 35% in number[6]. This measure is in force to date.

6.2 Effort control: suspended access to the fishery.

Jack mackerel is currently managed under a full exploitation regime. It consists of an effort control system, and is applied when the fisheries reach the fully exploited stage[7] i.e. "*the situation where the fishery reaches such a level of exploitation that the catch in authorized extractive units leaves no productive surplus of the hydrobiological species*". The main features of this regime are the following:

- Moratorium on the entry of new vessels to the fishery, i.e. the granting of new fishing permits is temporarily suspended.
- Indivisible transfer of vessels is allowed, together with the pertinent permit.
- A vessel may be replaced by another vessel of identical features.

6.3 Quota controls.

a. Total Allowable Quota.

In spite of the gradual suspension of new entries to the jack mackerel fishery, catches increased until reaching a maximum level of 4,400,000 tons in 1995. The fisheries Authority decided to strengthen management measures by establishing a

[33] For further details please refer to paper SPRFMO –III –SWG "Chilean conservation and management regime for *Trachurus murphyi*"

4 S.D. N° 458 of 1981, published in the Official Gazette on October 30, 1981.

5 S.D. N° 34 of 1983, published in the Official Gazette on April 4, 1983.

6 S.D. N° 2203 of 1996, published in the Official Gazette on January 11, 1996

7 Fully Exploited Stage: defined in Article 2, number 21, of the Fisheries Law.

maximum annual catch quota as of 1999[8]. Since then quotas have been established for each year as follows.

Table VII. Annual Catch Quotas (tons) for Jack mackerel, 1999-2009.

Year	Maximum Annual Catch Quota
1999	2.000.000
2000	No quota
2001	1.425.000
2002	1.625.000
2003	1.475.000
2004	1.475.000
2005	1.483.500
2006	1.400.000
2007	1.600.000
2008	1.600.000
2009	1.400.000

Quotas are established on an annual basis taking into account biomass estimates from direct assessments and monitoring of the fishery, exploitation criteria based on biological reference points and risk levels associated to different levels of exploitation, in accordance with international recommendations.

b. Regulation in the crisis period.

Following record catches in 1995, the jack mackerel stock began to show alarming signs of overexploitation evidenced by a higher presence of juveniles in landings. The tools available in the standing legislation at that time were not sufficiently flexible to address the problems of over investment in the fleet that affected the industry and to prevent an “Olympic race” for the stock. Consequently, new legislation was required to address these issues. The outcome was Law No. 19.713 (2001). The drafting and approval of new legislation, however, is inevitably a long and complex process and the fisheries Authorities handled the crisis with the available legal tools in the meantime.

During this period, the fisheries Authorities adopted a precautionary approach, and imposed national and absolute bans that paralyzed industrial activities for considerable time periods in order to avoid an even greater overexploitation that could lead to a collapse of the fishery. During this extended period, the fleet’s operation was reduced to participation in research fishing and an exceptional mechanism that permitted the temporary operation of a limited number of vessels to supply plants engaged in processing consumer food products.

[8] S.D. N° 604 of 1998, published in the Official Gazette on December 30, 1998.

c. Maximum Catch Limits per Ship Owner (MCL).

As mentioned above, a major overhaul of the regulation of the Chilean fisheries began in 2001. In the case of industrial fishing operations, this reform involved the implementation a system of individual quota allocations called Maximum Catch Limit per ship owner, MCLs, while maintaining the effort control regime in place.

The implementation of the MCLs produced the effects traditionally linked to the allocation of individual quotas: it put an end to the "Olympic race", it eliminated the irrational exploitation of fishing resources and the exaggerated over-investment in fishing efforts. It also allowed for a better use of catches, increasing investments in the plants and adding value to exports. It helped establish labor stability and security. More importantly, this adjustment process was carried out with no direct government incentives.

6.4 Application of Jack Mackerel management measures in the high seas.

In view of the straddling nature of jack mackerel, its conservation requires the adoption of management measures over its entire distribution area to avoid fishing activities in the high seas to deter the conservation efforts adopted in the area under national jurisdiction. For this purpose, the Ministry of the Economy, resorting to the powers vested in Article 165 of the Law of Fisheries[9] and through Supreme Decree No. 361 of 1999, extended the management measures established for the EEZ for the national fleet to the high seas. Consequently, all conservation and management measures in force for this species must be complied with by the national fleet, regardless of the fishing area.

Law No. 19.713 explicitly set forth that the MCL is deemed to be a management measure for the purposes of applying Article 165 of the Law of Fisheries. Consequently, only ship owners who have been allocated a MCL may catch jack mackerel on the high seas. Furthermore, jack mackerel caught outside the EEZ must be considered within the maximum catch limit allocated to each ship owner.

In addition, the national fleet operating in the high seas must comply with the obligations and requirements set forth in Supreme Decree No. 360, 2005, issued by the Ministry of the Economy that sets forth the recommendations and requirements established in different international instruments.

[9] Article 165 of the Law of Fisheries establishes that the Ministry of the Economy, by means of a Supreme Decree, based on a report from the Office of the Under-Secretary of Fisheries and in consultation with the Ministry of Foreign Affairs, may establish conservation and management standards for common stocks or related species inhabiting the exclusive economic zone and the high seas.

6.5 Monitoring, control and surveillance.

In order to ensure the effectiveness of management and conservation measures adopted for the EEZ and the high seas, the Chilean fisheries Authority has implemented the following monitoring, control and surveillance measures:

a. Vessel monitoring systems.

Law 19.521[10] requires ship owners of industrial vessels registered in Chile that engage in extractive fishing operations in waters under national jurisdiction or in the high seas, to fit their vessels with an automatic Vessel Monitoring Systems and keep them in constant operation. The requirement applies to all industrial vessels as of August 2000.

The satellite position signal of each vessel is automatically transmitted to the monitoring agencies (the Chilean Navy and the National Fisheries Service), in real time, thereby allowing 100% vessel coverage.

b. Catch reports and certification of landings.

Industrial ship owners authorized to engage in extractive fishing activities are required to report their catches, by vessel and fishing area, upon landing[11]. Catch reports must be certified by an auditing agency authorized by the National Fisheries Service[12].

Consequently, 100% of the landings made by the national fleet are controlled as described above.

c. Audits.

In order to conduct a double control of the catch data submitted by ship owners upon landing, the National Fisheries Service developed a program to audit the operation of processing plants. The purpose of the audit procedures is to verify that the supply of jack mackerel reported by the processing plants originates from duly reported catches and that they are consistent with the output of the relevant processing plant.

10 Law 19.521, published in the Official Gazette on October 23, 1997

11 Article 63, of the Law of Fisheries.

12 Article 10, Law 19.713.

d. Scientific observers.

Industrial ship owners are legally required to accept Scientific Observers appointed by the Undersecretariat for Fisheries[13] on board their vessels. Their role is to collect biological and fishing data on the species and related to the interaction between fishing and the environment.

6.6 Compliance and penalties.

a. Legal penalties.

The Law of Fisheries establishes legal penalties in the event of violation of the conservation and management measures adopted by the fisheries Authorities with respect to hydrobiological resources. A summary proceeding is brought before a civil court to enforce the sanction. Both the ship owner and the captain of the vessel involved are fined and the resource that gave rise to the violation is confiscated. In some cases, the fishing gear used to commit the violation is also confiscated.

The cost of the fine depends on the degree of the violation and the nature and amount of the resource involved. In the case of jack mackerel, applicable fines range from US$262 to US$525 (200 to 400 Euros), per ton of fish captured in violation of the management and conservation measures.

However, under the current fisheries management system, serious violations are subject to an administrative sanction involving a reduction in the MCL. The number of violations submitted to the Courts has decreased considerably since 2001.

b. Administrative sanctions

Law No. 19.713 on the Maximum Catch Limit established drastic administrative santions[14] for ship owners who incur in any of the following:

- Exceeding the allocated quota (MCL),
- Failing to report catches made,
- Failing to certify catches landed as required by law, or
- Discarding catches.

13 Article 19, Law 19.713.

14 Articles 11, 12 and 13, Law 19.713.

Sanctions for such violations include a reduction or discount of the MCL allocated to the offender. In the case of ship owners who exceed the allocated quota, the excess is discounted three-fold the following year, expressed in a percentage. In the case of other violations, the penalty involves discounts ranging from 10% to 30% of the quota allocated to the ship owner, depending on the degree of the violation. As indicated above, sanctions are determined administratively by the Undersecretariat for Fisheries. Offenders may present an appeal for these decisions to the Ministry of Economy.