



**South Pacific Regional Fisheries Management Organisation**

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**Chile 2013 Annual Report**

*Undersecretariat for Fisheries and Aquaculture - Chile*

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# **ANNUAL NATIONAL REPORT**

## **SPRFMO-SCIENTIFIC COMMITTEE**

### **JACK MACKEREL FISHERY IN CHILE**

September, 2013.

## 1. DESCRIPTION OF THE FISHERY

### 1.1 Composition of the Fleet.

Similar to what was recorded in 2012, from January to July 2013, the industrial purse seine fleet operating on jack mackerel, for both the SPRFMO area and Chilean EEZ combined, was composed by 94 vessels. This number along with the number of vessels recorded in 2012 are much lower than registered for previous years, maintaining the downward trend observed since 2009, when 129 vessels operated. The fleet reduction is mainly associated with the critical resource condition and its consequent catch quota reduction. It should be noted that during the last five years, vessels with less than 600 m<sup>3</sup> of hold capacity have represented an average percentage of 59% of the fleet (**Table I**).

In 2013, the jack mackerel fleet operated mainly within the Chilean EEZ, condition confirmed by only 9 vessels operating in the SPRFMO area. This low number is coincident with year 2012, and also represents a small fraction of the 67 vessels registered in 2009. Additionally, the fleet operating in SPRFMO area has been mainly represented by vessels with hold capacities greater than 900 m<sup>3</sup> (**Table II**).

**Table I.** Combined number of industrial purse seine vessels catching jack mackerel in both the Chilean EEZ and the SPRFMO area between 2009 and July 2013. Data were assembled by year and hold capacity. (2012\* and 2013\* are preliminary data).

Hold capacity (m3.)	2009	2010	2011	2012*	2013*
0-300	8	3	2	0	0
300-600	65	68	67	60	59
600-900	10	7	10	8	7
900-1200	19	17	10	6	4
1200-1500	10	10	11	9	10
1500-1800	11	11	12	9	9
1800-2100	6	6	5	5	5
<b>Total</b>	<b>129</b>	<b>122</b>	<b>117</b>	<b>97</b>	<b>94</b>

**Table II.** Number of industrial vessels catching jack mackerel in the SPRFMO area between 2009 and July 2013. Data were assembled by year and hold capacity. (2012\* and 2013\* are preliminary data).

Hold capacity (m3.)	2009	2010	2011	2012*	2013*
0-300	1	0	0	0	0
300-600	16	0	0	0	0
600-900	5	4	4	0	0
900-1200	17	12	4	2	2
1200-1500	10	8	9	1	3
1500-1800	12	12	10	3	3
1800-2100	6	6	5	3	1
<b>Total</b>	<b>67</b>	<b>42</b>	<b>32</b>	<b>9</b>	<b>9</b>

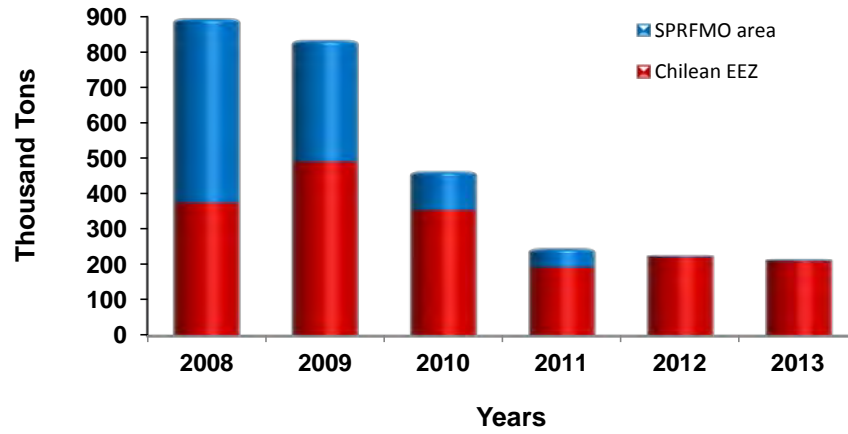
## 1.2 Catches, Seasonality of Catches, Fishing Grounds and Bycatch

### Catches

By July 2013, accumulated jack mackerel catches adding up 216,000 tons were registered, matching catches for the same period in 2012. However, only 5,500 tons were caught in the SPRFMO area, accounting for only 3% of the total catch by the national fleet, and representing a 1,300 tons increase compared to 2012 (**Figure 1 and Table III**).

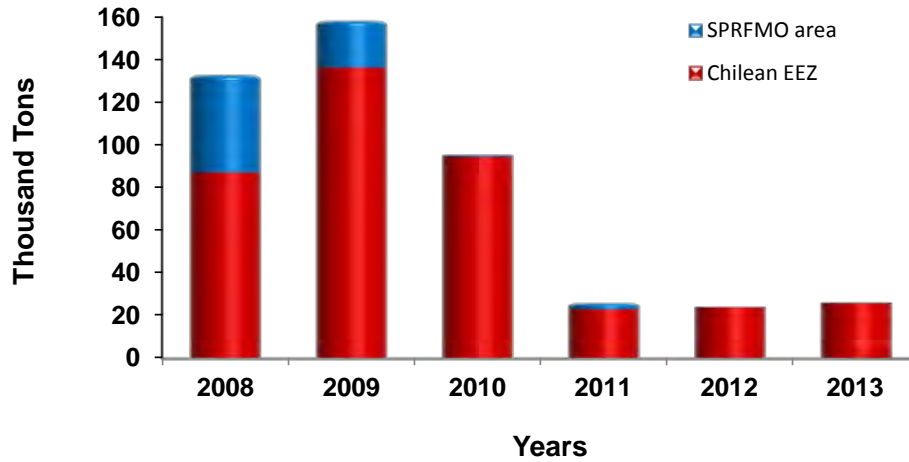
Constrained by small quotas, the jack mackerel catches in the northern area of the country remained low for third consecutive year. Thereby, by July 2013 only 14,000 tons have been registered in this area, representing 6,5% of the national total cumulative. It should be pointed out that these catches were mainly represented by jack mackerel caught as bycatch by the anchovy fishery.

Besides jack mackerel, chub mackerel catches by the national fleet were also registered in 2013, adding up 26,000 tons by July, and equaling catches observed in 2011 and 2012. However the chub mackerel catches in the SPRFMO area do not exceed 1% of the total Chilean catch for this resource in 2012 and 2013 (**Figure 2 and Table IV**).



Years	Chilean Jack mackerel (t)		
	Chilean EEZ	SPRFMO area	Total
2008	376,370	519,738	896,108
2009	491,792	343,135	834,927
2010	355,510	109,298	464,808
2011	193,722	53,573	247,295
2012	223,322	4,138	227,460
2013	210,977	5,500	216,477

**Figure 1** and **Table III.** Yearly jack mackerel catch in the Chilean EEZ and the SPRFMO area with purse seine nets for the period 2008 - July 2013.

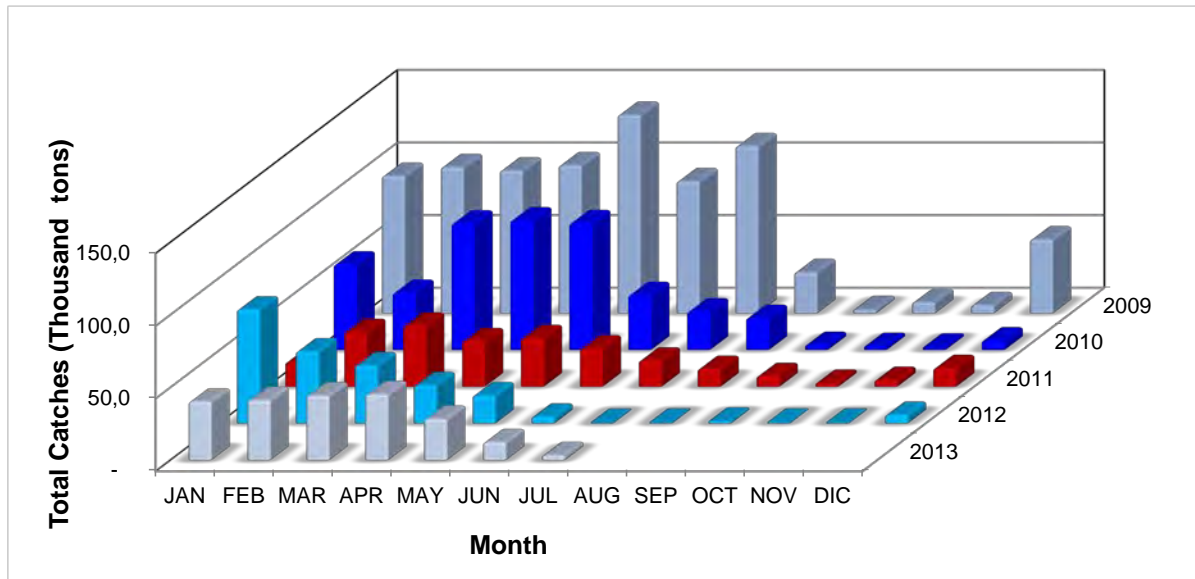


Years	Chub mackerel (t)		
	Chilean EEZ	SPRFMO area	Total
2008	87,316	45,702	133,018
2009	136,516	21,936	158,452
2010	94,723	936	95,659
2011	23,077	2,979	26,056
2012	24,120	199	24,319
2013	26,082	243	26,325

**Figure 2** and **Table IV**. Yearly chub mackerel catches in the Chilean EEZ and SPRFMO area with purse seine nets for the period 2008 - July 2013.

### Seasonality of Catches

Between January and April 2013, monthly jack mackerel catches remained stable around 43 thousand tons and then decreased to negligible values in July. This pattern is similar than the observed in 2012, evidencing an early decline in catches that accounts for a progressive shortening of the fishing season, considering that before 2012, was common to register significant catches by July (**Figure 3**).



**Figure 3:** Seasonality of jack mackerel catches by the purse-seine fleet for the period 2009 - July 2013. Source: SERNAPESCA.

### Spatial Distribution of Catches

During 2012 and 2013, catches for jack mackerel in the northern area of the fishery continued the spatial pattern observed in previous years, with fishing operations restricted to a coastal area encompassed within 50 nm from the seashore. However, compared to the same period in 2012, a slight southbound movement in latitudinal pattern of catches ( $22^{\circ}$ - $23^{\circ}$  S) was observed during the first half of 2013 (**Figure 4**).

During 2012, the fleet operating in the central south area, exhibited an unusual catch pattern compared with previous years, restricting its fishing operations to the first 100 nm from seashore, not evidencing the typical dispersal toward oceanic waters during the second and third quarter of the year. During the first half of 2013, the jack mackerel's catches, displayed the same pattern observed in 2012, with fishing operations circumscribed to the EEZ, and concentrated in Regions V and VIII ( $32^{\circ}$ - $37^{\circ}$  SL) (**Figure 4**).

Reduced catches of jack mackerel in the high seas were obtained at two locations; around  $31^{\circ}$  and  $37^{\circ}$  SL, both positioned near the western limit of the Chilean EEZ.

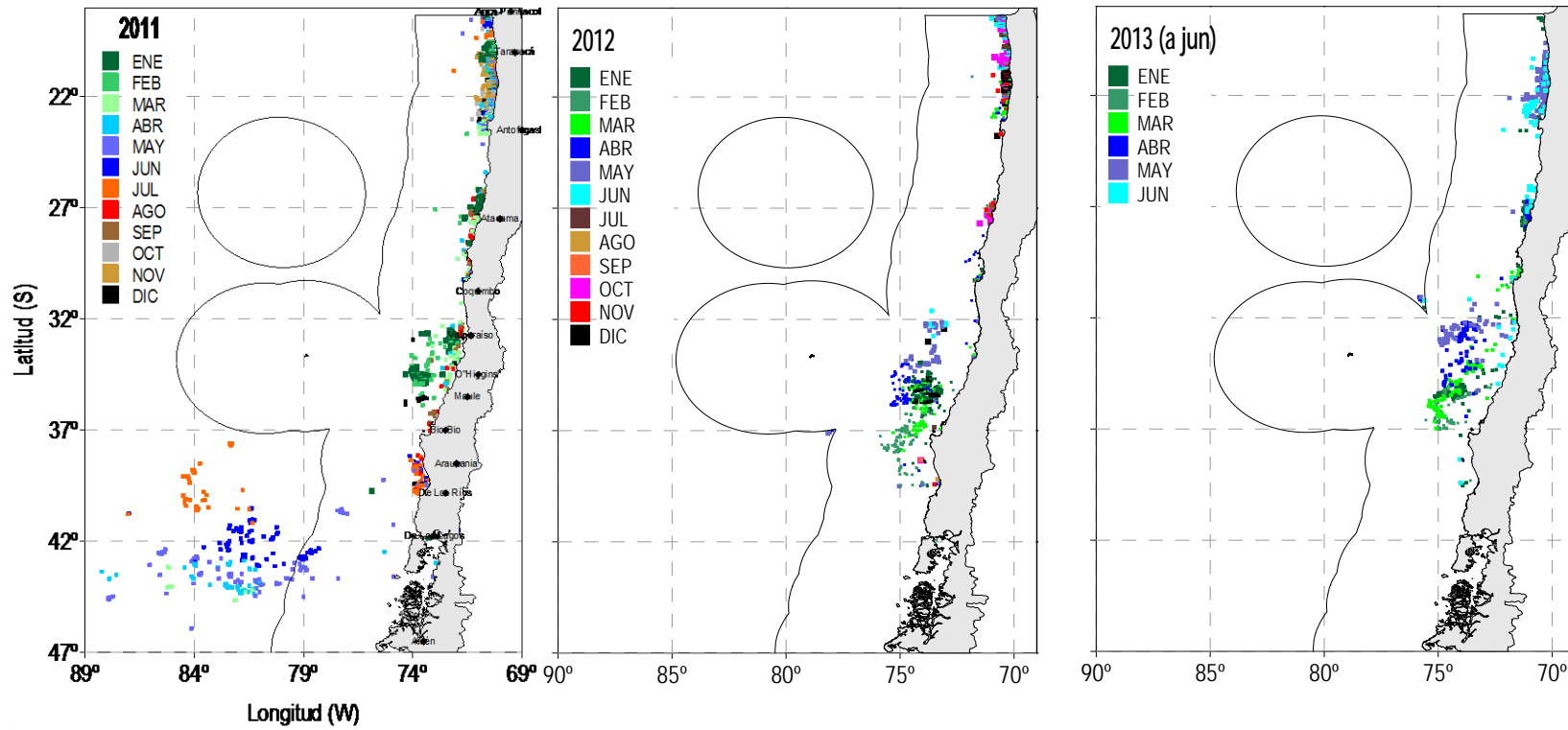


Figure 4: Spatial-temporal distribution of industrial jack mackerel purse seine fleet 2011, 2012, and june 2013. Source: IFOP.



## Bycatch

Catches in the SPRFMO area in 2012 were mainly represented by the target species jack mackerel (*Trachurus murphyi*) (98.2%), with only small amounts of bycatch composed by chub Mackerel (*Scomber japonicus*) (1.8%). A similar pattern was observed inside the EEZ, where the main species caught as bycatch were chub mackerel (2.2 %).

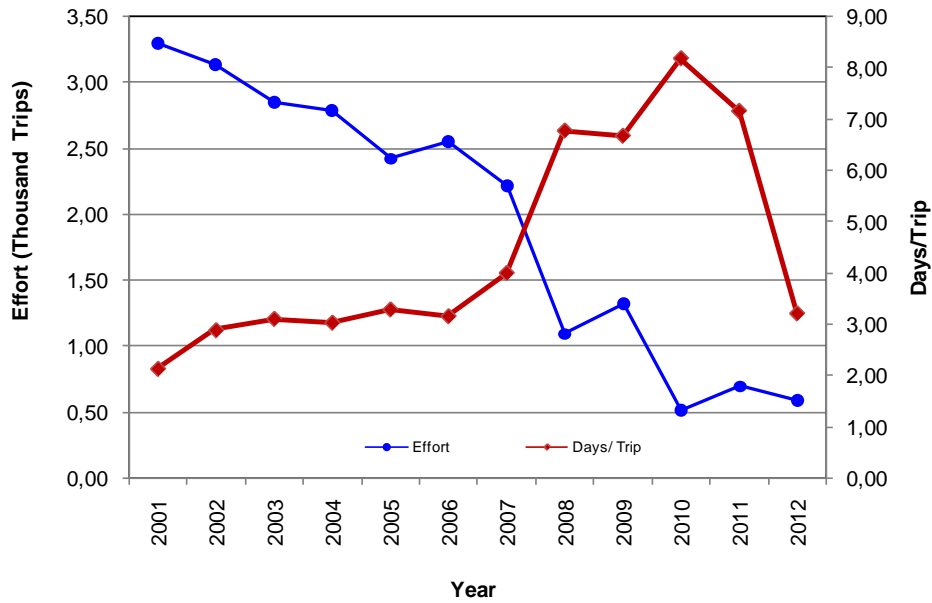
In the northern zone of the country, jack mackerel was mostly caught as bycatch by the anchovy fishery.

## 2. EFFORT AND CPUE FOR JACK MACKEREL FISHERY

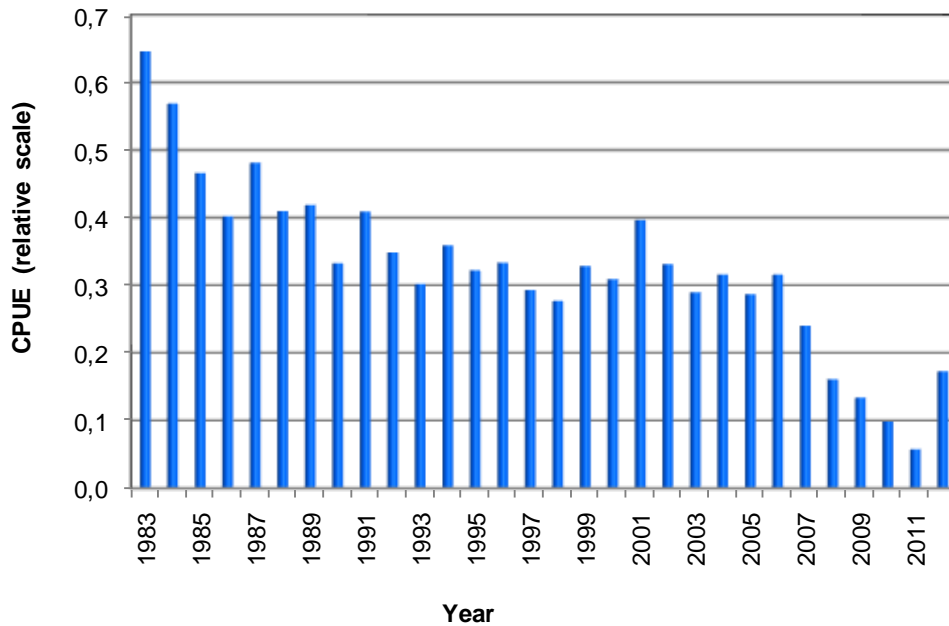
The information contained in this section concerns the central-southern zone fleet, targeting primarily jack mackerel. Catch, effort, and CPUE are referred to fishing trips in which jack mackerel represented more than 50% of the total catch.

Consistent with the low catches of jack mackerel in recent years, the fishing effort in 2012 (measured in number of fishing trips with catch) remained at low levels, similar to 2011 and 2010. On the other hand, compared with previous years, the average extent of fishing trips registered a significant decline (60%), due to the operation of the fleet in areas closer to the seashore, within the EEZ of Chile (**Figure 5**).

The standardized CPUE, measured as the utilization rate of the carrying capacity of the fleet (catch/(hold capacity displaced x length of fishing trip)) showed a steady trend between 1989 and 2006, followed by a declining tendency from 2007 to 2011; in 2012 an increase of this index was observed. (**Figure 6**).



**Figure 5:** Effort in number of trips with catch (blue), and length of fishing trips in days (red) for the purse seine fleet in the center-southern zone, period 2001-2012. Data SERNAPESCA. Source: IFOP.



**Figure 6:** Standardized CPUE for the purse seine fleet in the center-southern zone, period 1982-2012. Source: IFOP

### 3. RESEARCH PROGRAMS

The jack mackerel research program includes standard projects carried out annually by IFOP along with complementary projects. The information obtained is used by the authority to support the decision-making process.

Basic projects performed by IFOP during 2012:

- ***Hydroacoustic assessment of jack mackerel biomass between XV-III Regions, 2012***

This research cruise took place from March 21<sup>st</sup> through April 24<sup>th</sup> 2012, and included the area between the northern boundary of the country and 28°50' SL, where perpendicular transects from the coast, reaching up to 100 nm were prospected. As a result, in the prospected area, a jack mackerel biomass of 231,000 tons was estimated.

- ***Hydroacoustic assessment of jack mackerel biomass between V-X Regions, 2011***

This research cruise took place from June 14<sup>th</sup> through July 12<sup>th</sup> 2012. Before its development a prospecting cruise was undertaken. Its results evidenced the need of modifying the traditional research area, including a 5-200 nm area between 32°10'SL and 36°00'SL and a 200-600 nm oceanic area between 37°30'SL and 40°00'SL. As a result, in the prospected area, a jack mackerel biomass of 127,000 tons was estimated.

- ***Biological condition of jack mackerel in the high seas, 2012***

This project was carried out in December 2012 (1<sup>st</sup> to 11<sup>th</sup>), covering an oceanic area both inside and outside the Chilean EEZ, delimited by 74° - 92° W and 32°12' - 37°30'SL. As a preliminary result, in the prospected area, an average density of 23,6 eggs per 10 m<sup>-2</sup> and an average density of 9,9 larvae per 10 m<sup>-2</sup> was estimated for jack mackerel.

- ***Monitoring of the jack mackerel fishery***

This study allowed obtaining real-time information on the evolution of the main biological and fishing parameters associated with the jack mackerel fishery and its bycatch. The monitoring was carried out along the entire maritime space between the north boundary of Chile and 47°00' SL, and included information gathered from both the small-scale fleet, and the industrial fleet.

- ***Jack mackerel stock assessment and total allowable catch estimation***

Similarly as done by the SPRFMO SWG, this study used the Joint Jack Mackerel (JJM) model. The project was aimed to set up the status of the resource, and also to assess biologically sustainable exploitation rates. The results were used by the Authority to improve the stock evaluation, simulate different exploitation scenarios and conduct additional analyses.

According to needs and requirements outlined in the SWG framework, in addition to the standard projects named above, during 2013 the following complimentary project was also carried out:

- ***Jack mackerel stock structure assessment (Phase II)***

The results obtained in the project: “Jack Mackerel Stock Structure Assessment (Phase I)” called for additional studies implementing a multidisciplinary approach, in order to assess the stability of the parameters/markers used in Phase I. In addition, it was recommended to include seasonal samplings to reduce potential uncertainty on Phase I data.

The conclusion of this project (Phase II), initiated in 2011, has been predicted for late 2013. However, in September 2013, the Fisheries Research Council recommended to extend some studies and analysis that are expected to be performed during 2014.

#### 4. **BIOLOGICAL SAMPLING AND LENGTH AND AGE COMPOSITION OF CATCH.**

##### 4.1 **Biological sampling.**

Biological information is obtained on a regular basis from samples collected along the Chilean coast for both the target species (jack mackerel) and its associated species. Samplings are conducted on a daily basis, mainly at landing sites/processing plants, but are also complemented with information gathered by scientific observers on board fishing vessels. The information collected included fork length measurements, otolith collection, total weight, gutted weight, gonad weight, and sex and maturity stages.

The amount of length and biological samples obtained for jack mackerel during 2012 added up 34,347 and 14,389 specimens, respectively. Compared to 2011, the number of length samples for jack mackerel decreased significantly. This condition was related with the decrease in the number of vessel operating on this resource as well.

For the industrial fleet, samples included at-sea sampling as well as port sampling, covering all the range reported for this fishery in Chile. The main landing ports sampled were Iquique in the north area, and San Vicente and Coronel in the central-southern area of the fishery (**Table IV**).

Chub mackerel, the main bycatch for jack mackerel, was also sampled during 2012. A total of 1,538 and 267 specimens for length and biological samples were collected respectively, similar to values reported in 2011.

**Table IV.** Number of Jack mackerel and Chub mackerel specimens collected in 2012 to gather biological and length samples.

Landing Port	Jack mackerel (t)		Chub mackerel (t)	
	Lenght Sampling	Biological Sampling	Lenght Sampling	Biological Sampling
ARICA	375	50	78	0
IQUIQUE	2.239	739	1.113	30
ANTOFAGASTA	2.009	416	324	5
MEJILLONES				
CALDERA	0	0	0	0
COQUIMBO	912	483	0	0
SAN ANTONIO	50	150	0	0
TALCAHUANO				
SAN VICENTE	21.862	8.744	23	211
CORONEL	6.900	3.807	0	21
LOTA				
CORRAL	0	0	0	0
CALBUCO				
<b>TOTAL</b>	<b>34.347</b>	<b>14.389</b>	<b>1.538</b>	<b>267</b>

Source: IFOP.

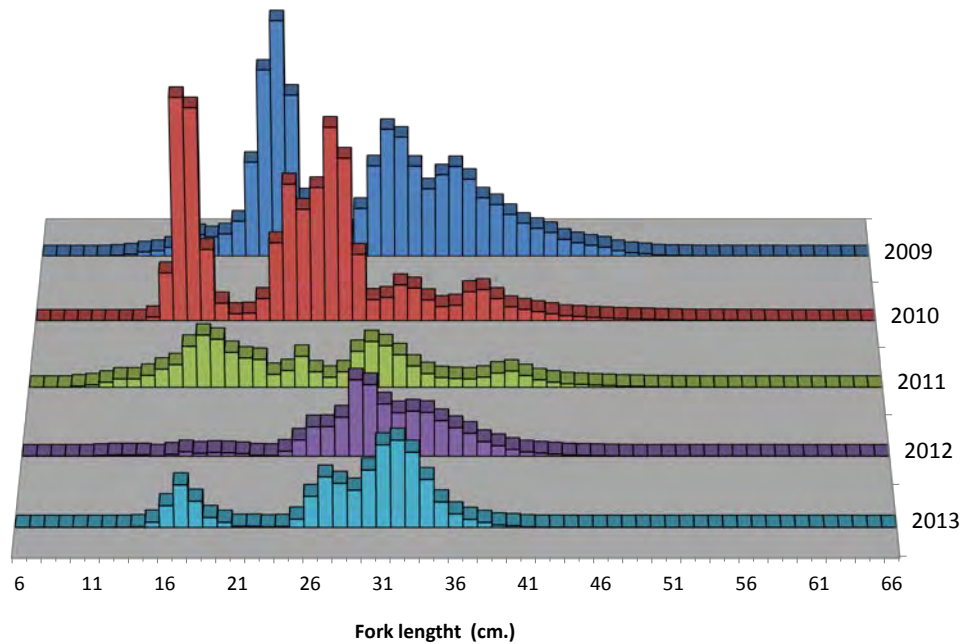
## 4.2 Length and age composition of catches

### a.- Jack mackerel

As seen in previous years, during the first half of 2013, the size structure for jack mackerel showed a multimodal distribution, with a slight shift of the main mode toward larger sizes. Compared with previous years, these larger sizes displayed a restricted range.

During this period the main mode was 32 cm FL, followed by a secondary mode of 27 cm FL. Both values belong to specimens caught in the south-center area of the fishery, where juveniles have been of low occurrence since 2011(**Figure 7**).

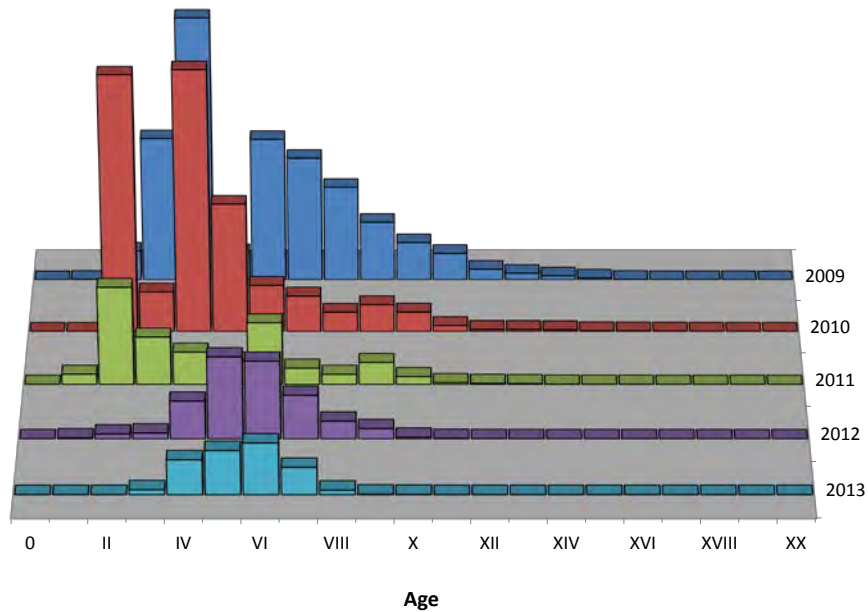
It should be noted that a smaller mode occurred in the 17 cm FL, corresponding to juvenile specimens caught in the north area of the fishery, where juveniles are frequent except for 2012, when they were diminished.



**Figure 7.** Length structure of jack mackerel, total catch in number 2009 - June 2013. Source: IFOP

The age structure in 2012 is supported in four ages normally distributed, ranging from age IV to VII, with modes in ages V and VI. The age II mode commonly registered in previous years, was absent in 2012.

For 2013, information is only available for first quarter of the year in the south-central area, which presents a size distribution similar to 2012. The fishery remains focused in four ages normally distributed with a mode in age VI (**Figure 8.**)



**Figure 8:** Age structure of jack mackerel, total catch in numbers, 2009-2012, and January–march 2013 (south central area). Source: IFOP.

### b. - Chub mackerel size composition

Considering the slow catches for this resource for the last three years (2011-2013), samples obtained are not representative enough to establish a national age structure.

However, it is possible to indicate as a reference, that samples obtained in 2011 from Coquimbo towards northern Chile displayed a dual mode around 21 and 32 cm FL. While in the first half of 2013 only one mode in 31 cm FL. was observed.

## 5. AT-SEA AND PORT SAMPLING PROGRAM.

The sampling program carried out by observers on board fishing vessels and at landing ports/processing plants has not been significantly modified with regard to previous years. However, the program is continuously improving its information and



online data collection system, optimising the information gathering, processing, and response times, with a settled quality standard.

To estimate the level of sampling coverage in the SPRFMO area, only fishing trips targeting jack mackerel (i.e. over 50% of the total catch per fishing trip) that also carried observers on board and/or included at-port samplings by observers, were considered.

Since the jack mackerel fishery displayed mostly coastal operations in 2012, none of the few trips and sets made in the SPRFMO area were monitored by observers on board. However, a 16,7% of these unobserved trips were sampled at port during the offloads (**Table V**).

Inside the EEZ of Chile, on board sampling coverage by observers was 12,3%, and at-port sampling coverage was 20,6%, with a combined total sampling coverage of 32,9%.

**Table V.** Sampling coverage of fishing trips for Chilean jack mackerel fleet by observers in port and on board

	At-Port	On board	Total
Chilean EEZ	20,6%	12,3%	32,9%
SPRFMO area	16,7%	0,0%	16,7%
Total	20,5%	12,1%	32,6%

## **6.- ADMINISTRATIVE MEASURES**

### **a.- Total catch quota.**

Each year, by the month of December, the Undersecretariat for Fisheries and Aquaculture establishes catch quotas for every resource in full exploitation regime. In 2013, the quota for jack mackerel proposed by the Undersecretariat and approved by the National Fishing Council was 282 thousand tons.

Subsequently and according to agreements reached in January 2013 during the 1<sup>st</sup> Meeting of the SPRFMO in New Zealand, the annual quota for jack mackerel (including high seas and EEZ catches) was reduced to 249,796 tons (Exempted Decree N° 427/2013), which are close to be exhausted.

### **b.- New Chilean Fisheries and Aquaculture Law, 2013**

By February 2013, came into force a major modification to the General Chilean Law of Fisheries and Aquaculture which incorporates both the ecosystem approach and the precautionary principle to fisheries management as well as the definition of a National Fishing Policy, the implementation of Management Committees and Technical Scientific Committees. From now on, this latter Committee will have the mission of assessing and propose biologically sustainable catch ranges for every fishery.

For depleted fisheries like jack mackerel, this new law establishes the development of a Recovery Plan, as an integral part of the Management Plan for the fishery. Both Plans should be consistent with management and conservation measures established by the SPRFMO.