National report of China to the 2010 SPRFMO Science Working Group

1. Brief Introduction of Chinese Jack Mackerel Fishery

In the year 2000, Chinese factory trawler "KAIXIN" began its exploratory trips for Chilean Jack Mackerel (*Trachurus murphyi*) in the high seas of Southeast Pacific. The total catch was 2,318 t in 41 fishing days. Since then, China fishing fleets have continued their commercial fishing in this region.

The number of fishing vessels reached 16 but actually operated in the region was varied between 11 and 13 after the year of 2004. Since 2005, the Chinese fishing fleet has been upgraded, 9 vessels are replaced by larger vessels in greater than 4,000 GRT, around 7,847 tons, and the rest 4 vessels under 4,000 GRT.

Table 1 Chinese Chilean Jack Mackerel fishing fleet composition

year	number of the fishing vessels	Registered tonnage, GRT		gear type
		<4,000	⩾4,000	
2004	12	10	2	pelagic trawl
2005	13	11	2	Pelagic trawl
2006	12	6	6	Pelagic trawl
2007	11	4	7	Pelagic trawl
2008	11	4	7	Pelagic trawl
2009	13	4	9	Pelagic trawl

The annual yield of Chilean Jack Mackerel fluctuated between 2,318 and 160,000 t from the year 2000 to 2009 and it is 118,000 t in 2009.

The catch and effort of CJM of Chinese fishing fleet are presented in Table 2.

Table 2 Catch and effort of CJM by Chinese fishing fleet

year	Catch in tons	fishing day	Catch per day per vessel in tons
2000	2, 300	41	56
2001	20, 090	497	40
2002	76, 261	1,477	52
2003	94, 690	1,569	60
2004	131, 020	2,271	58
2005	143, 000	2,474	58
2006	160, 000	1,811	88
2007	140, 582	2,033	69

2008	143182	1723	83
2009	117963	1567	75

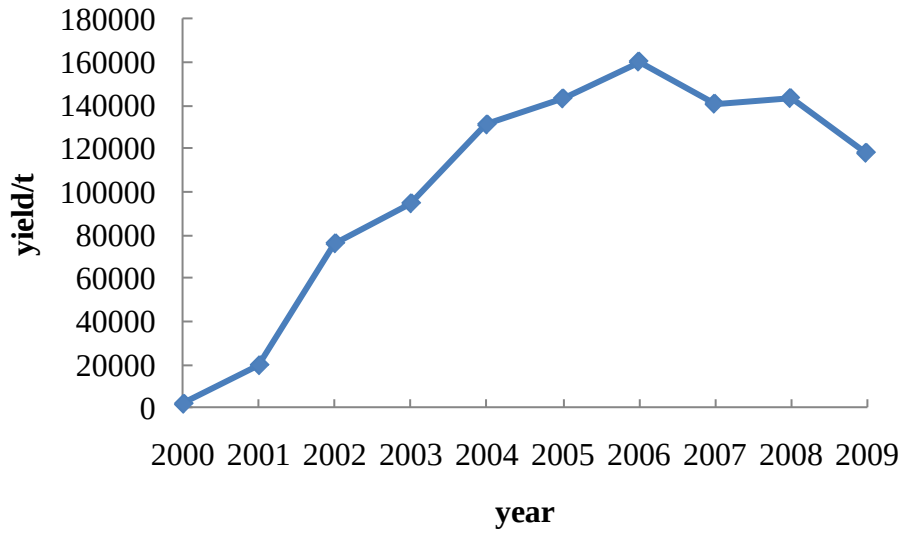

Fig. 1 The annual yield of Chilean Jack Mackerel of Chinese fleet

The average daily catch per vessel fluctuated between 40 and 88 t in these years. It is higher in recent 4 year due to the fishing fleet upgraded.

Chilean Jack Mackerel is the main target species in the catch. Japanese mackerel (*Scomber japonicus*) as by-catch was found less than 1-13% in the total catch. There are a few of other spices, such as pacific scad (*Scomberomorus sierra*), yellowtail (*Seriola laland*), lantrenfishes (*Myctophidae*) etc as bycatch. Jumbo flying squid (*Dosidicus gigas*) has been caught by trawls since 2006, which is about 5-10% in the catch.

2 Fisheries Data Collection and Research Activities

China Fisheries Association (CFA) and Shanghai Ocean University (SHOU) jointly take charge of the Jack Mackerel fisheries data collection and research activities.

The fisheries data collection was carried out by Chinese fishing fleet cooperating with the Chinese fishery scientific observers program. And a full log books collection program have been carried out from 2007 and delivered to SHOU for statistics and study purpose.

The biological data and environment data were measured and collected on board by the fishery scientific observers. And the catch data were collected from log books or directly sampled from the catch. Data from log book mainly are catch per tow, fishing time and positions, towing speed etc. Environment data about fishing ground

are also collected including wind direction and speed, SST, and data of STD etc.

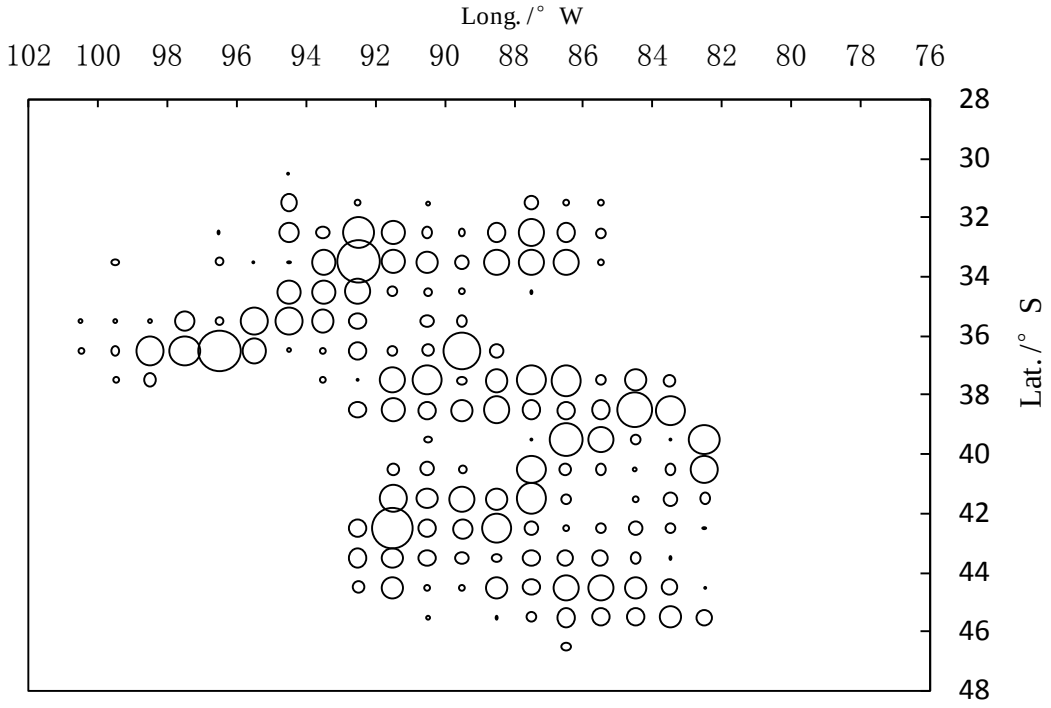

Fig 2 1°×1° Catches of Chilean Jack Mackerel by Chinese fishing fleet in 2008 in Southeast Pacific Ocean (FAO Area 87)

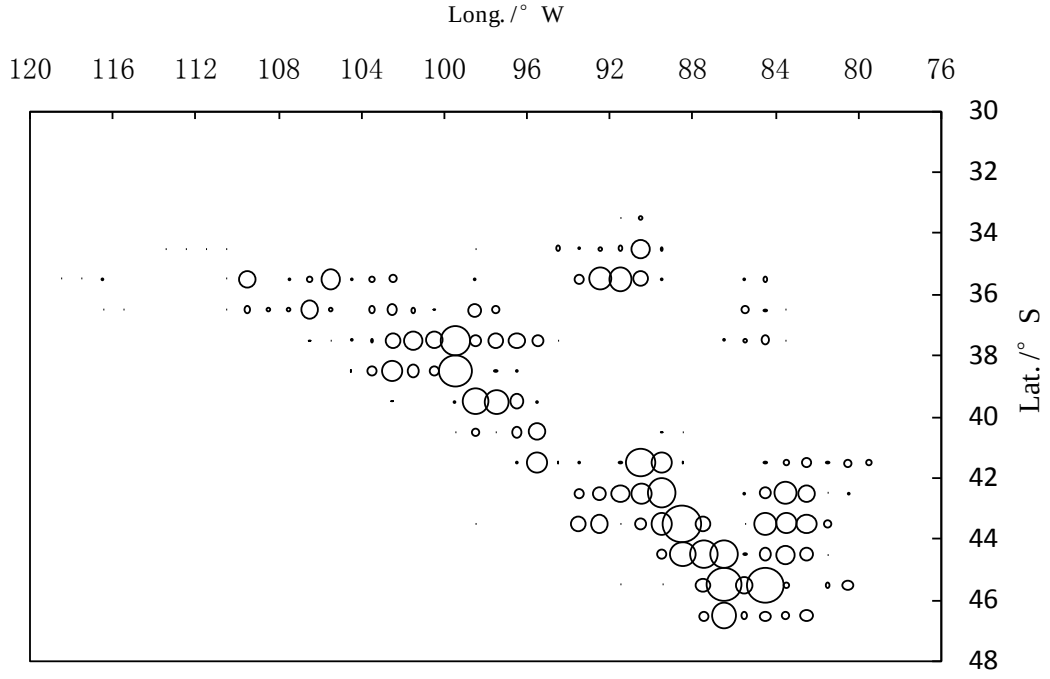

Fig 3 1°×1° Catches of Chilean Jack Mackerel by Chinese fishing fleet in 2009 in Southeast Pacific Ocean (FAO Area 87)

Biological items measured on broad by the random sampling are fork length, body

height, width and girth, body weight and net weight without organs, sex, germ cells maturity, contains in the stomach etc.

Depth of fish school inhabited in the water and temperature related were recorded by the echo sounder, net sounder and sonar.

The otolith collected on board and delivered to the SHOU laboratory for appraisal age.

The maturity situation of germ cells and stomach containing were observed and sorted in six grades and five grades respectively according with the national standards of the Chinese marine fish survey.

Plankton and botany were collected in predetermined positions, and identified according to marine fishery survey standard.

The studies on Chilean Jack Mackerel take by Chinese scientists were mainly in the fields of biological characteristic, distribution of stocks and population, fishing ground, oceanic environment, DNA, etc.. The major research activities in the future will be Chilean Jack Mackerel resource survey, stock assessment, DNA tests and so on.

3. Biological Sampling and Length / Age Composition of Chilean Jack Mackerel

Altogether 16,244 Chilean Jack Mackerel samples have been collected in the past years, the measurements have been made on board, i.e. fork length, body weight, net body weight, body girth, body height, body width, the germ cells maturity, the stomach contain and fullness etc. 3,050 otoliths and 43,953 folk length data by punching hole (mark the folk length on a piece of oilpaper by punching a hole) have been collected too. The results are showed in table 3, 4 and fig. 4, 5 and 6.

Table 3 fork length (mm) composition of Chilean Jack Mackerel

year	Min.	Max.	〈250	250~299	300~349	350~399	400~449	450~499	500~549	550~599	〉600
2000	223	618	4.1%	46.6%	19.7%	11.5%	10.6%	4.4%	1.9%	1.0%	0.2%
2001	212	598	2.7%	57.4%	29.1%	6.1%	2.9%	1.4%	0.3%	0.1%	0.0%
2002	116	483	19.5%	64.5%	12.3%	1.9%	1.3%	0.5%	0.0%	0.0%	0.0%
2006	193	515	0.0%	13.9%	69.0%	12.7%	3.5%	0.8%	0.1%	0.0%	0.0%
2007	305	510	0.0%	0.0%	20.1%	46.4%	25.5%	7.1%	0.9%	0.0%	0.0%
2008	280	520	0.0%	0.5%	52.4%	38.5%	7.2%	1.3%	0.1%	0.0%	0.0%
2009	164	543	3.0%	0.0%	4.3%	69.7%	19.2%	3.3%	0.5%	0.0%	0.0%

Table 4 The relationship between age and fork length of *Trachurus murphyi* in 2009

size class (FL/mm)	age class								number
	2+	3+	4+	5+	6+	7+	8+	9+	
190-200	1								1
260-270		1							1
270-280		1							1
280-290		15	28						43
290-300		5	113						118
300-310			205						205
310-320			174	1					175
320-330			120	19					139
330-340			45	36					81
340-350			4	41					45
350-360				42					42
360-370				21	2				23
370-380				11	8				19
380-390				4	14				18
390-400					8	1			9
400-410					8	4			12
410-420					1	4			5
420-430						8			8
430-440						5			5
440-450						1	2		3
450-460							4		4
460-470							1		1
470-480							2	1	3
480-490								0	0
490-500								1	1
500-510								0	0
510-520								1	1
number	1	22	689	175	41	23	9	3	963
mean fork length	193.00	287.73	311.55	348.66	389.44	421.61	459.67	496.00	
standard deviation	0	5.93	12.33	14.62	12.61	12.36	9.55	15.12	

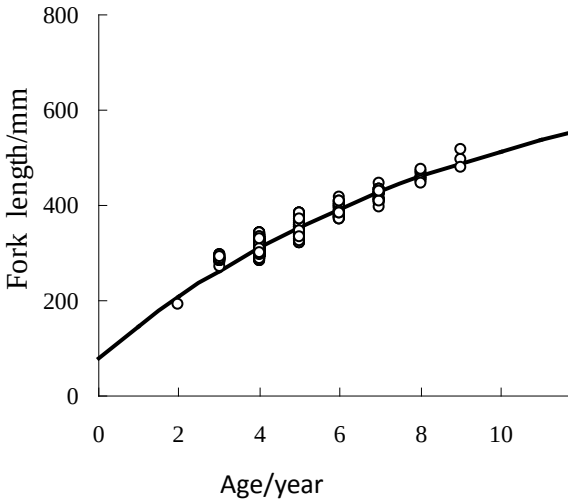

Fig. 4 The predicted von Bertalanffy growth curve and observed length-at-age for *Trachurus murphyi*, $L_t = 738.9[1-\exp(-0.108(t+1.08)]$ R^2=0.81

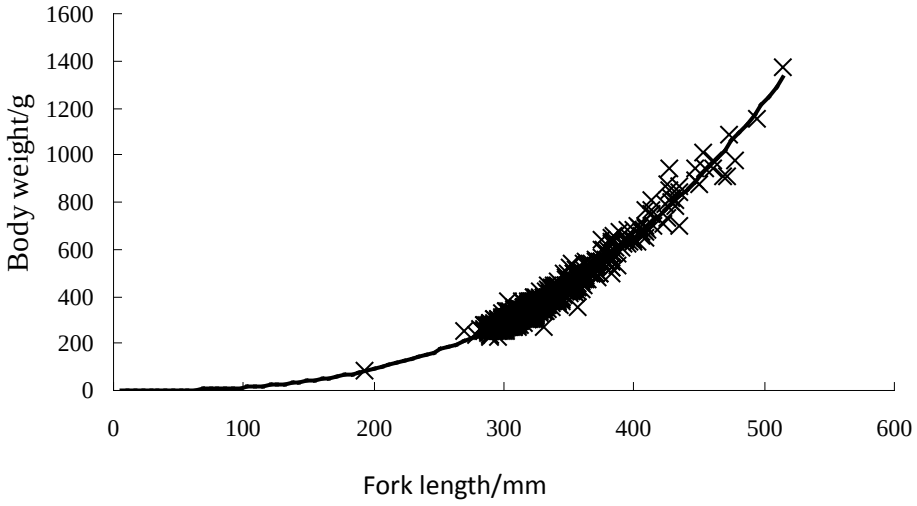

Fig.5 Fork length-weight relationship for *Trachurus murphyi*, $W=2.5293*10^{-5}L^{2.8472}$ R^2=0.95

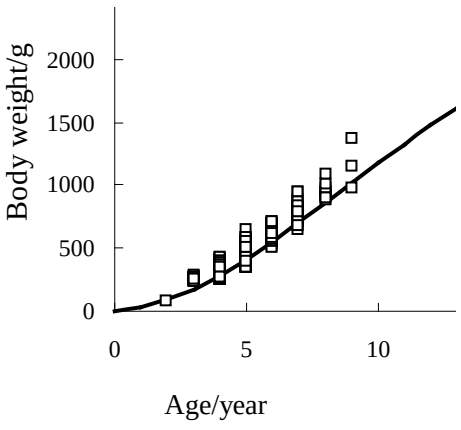

Fig.6 The von Bertalanffy growth curve in terms of weight and observed weight-at-age for *Trachurus murphyi*, $W_t = 3974.04[1-\exp(-0.108(t+1.08)]^{2.9}$ R^2=0.82

4. Fishery Scientific Observer Program

In order to implement “Standards for the collection, reporting, verification and exchange of data” of SPRFMO, China fishery Authority and CFA accredit SHOU for the observers training, selection and dispatch, etc. SHOU also responds for the data evaluation and debug, and related studies. The FSOP has been already under way since 2007. Three of Chinese fishing vessels as coverage of 3/13 or 23%, were dispatched the observers on board, namely “Kai Xin”, “Kai Fu” and “Fu Xing Hai”.

The required observer data has been submitted to SPRFMO secretariat already and the work of CPUE standardized is under way.