South Pacific Regional Fisheries Management Organisation

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CHINA 2012 NATIONAL REPORT

National Report of China

1. Brief Introduction of China CJM Fishery

Chinese fishing fleet has commenced its CJM fishery in the high seas of Southeast Pacific since 2000. The number of fishing vessels reached 16 as maximum, however, the vessels operated in the region was varied between 11 and 13. And it was reduced to 9, even 3 vessels in the recent years as required for the fishing effort reduction. Chinese fishing fleet consists of 9 factory trawlers greater than 4,000 GRT, and 4 vessels less than 4,000 GRT.

Table 1 Chinese CJM 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
2010	9	0	9	Pelagic trawl
2011	6	0	6	Pelagic trawl
2012	3	0	3	Pelagic trawl

The annual yield of CJM fluctuated between 2,318 and 160,000 t from the year 2000 to 2012 and it is 32862 t in 2011. It is 8112 t from Mar. to Jul. 2012 and the yield of Chub mackerel is 4 t only in the same period. The annual average catch per fishing day per vessel fluctuated between 40-88 t。

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	Average catch per fishing day per vessel in tons	GAM standardized CPUE (t/hour)	year effects on CPUE estimated by GAM analysis
2001	20,090	497	40	3. 34	1. 39
2002	76,261	1,477	52	5. 02	1. 93
2003	94,690	1,569	60	5. 32	1. 71
2004	131,020	2,271	58	4. 23	1. 4
2005	143,000	2,474	58	5. 82	1. 4
2006	160,000	1,811	88	6. 86	0. 99
2007	140,582	2,033	69	5. 9	1. 11
2008	143,182	17,23	83	6. 79	0. 81
2009	117,963	1,567	75	7. 25	0. 77
2010	63,606	921	69	4. 49	0. 55
2011	32,862	591	56	2. 98	0. 32
2012*	8112	-	-	-	

* from Mar. to Jul.

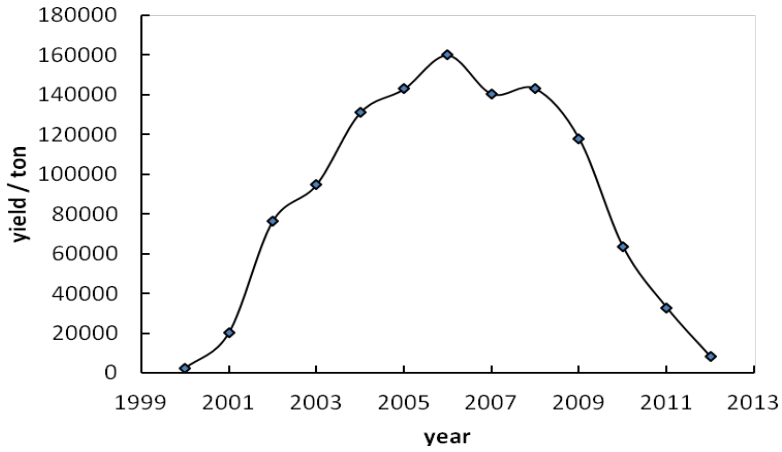

Fig. 1 The annual yield of CJM of Chinese fleet

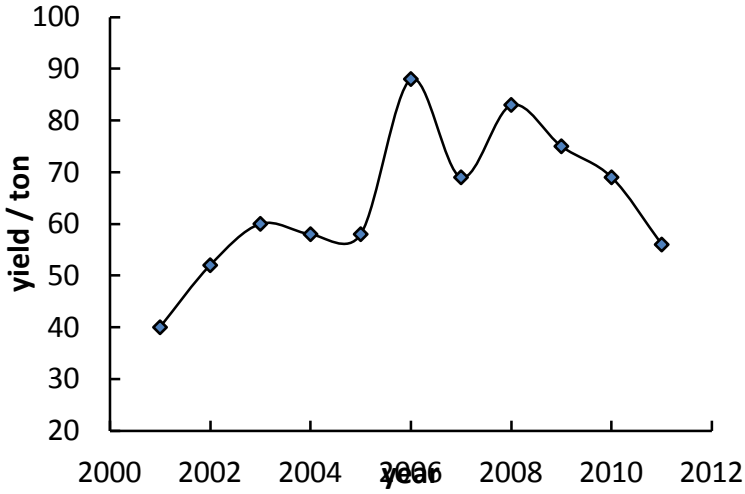

Fig. 2 Average yield of CJM of Chinese fleet per fishing day per vessel in tons

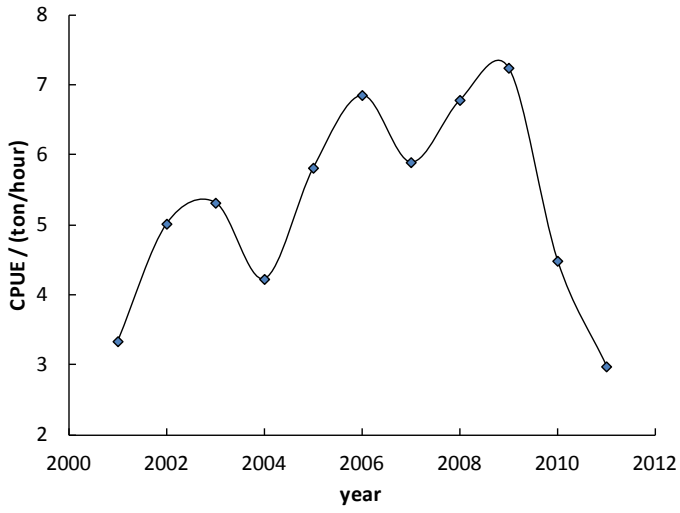

Fig. 3 GAM standardized CPUE of China fleet

Generalized additive model (GAM) was applied to the standardization of catch per unit effort (CPUE) for Chilean jack mackerel from Chinese factory trawl fishing fleets in the Southeast Pacific Ocean from 2001 to 2011. A total of 10 factors were selected to add GAM one by one, including Year, Month, Vessel, Latitude, Longitude, La Niña and El Niño events (ELE), Nino3.4 index, Sea surface temperature (SST), Sea surface height (SSH) and Chlorophyll-a concentration (Chl-a). Models were built by adding new variables and observing the corresponding improvement on the fit with non-significant variables omitted. Alternative model structures (different choices on the explanatory variables) were compared using the Akaike Information Criterion (AIC). The final GAM was expressed as:

$$\ln(CPUE+0.1) \sim Year + Month + Vessel + ELE + s(Longitude) + s(Latitude)$$

$$+ s(SST) + s(SSH) + s(Chl\text{-}a) + s(Nino3.4index)$$

The result indicated that all the 10 factors impacted on the catch rate of Chilean jack mackerel significantly ($p<0.05$), and AICs were reduced with the explanatory variables added to the GAM model one by one. Standardized CPUE and estimated year effect by GAM were shown in table 2. It shows that the GAM standardized CPUE and the year effects on CPUE estimated by GAM analysis fluctuated between 2.98 to 7.25 t and 0.32 to 1.93 from the year 2001 to 2010. All of them declined in recent year.

CJM is the main target species in the catch in 2000 to 2012. Chub mackerel (*Scomber japonicus*) as by-catch was found 0% -10% in the catch in 2010 to 2012, and also a few of other spices, such as jumbo flying squid (*Dosidicus gigas*), pacific scad (*Scomberomorus sierra*), yellowtail (*Seriola laland*), lantrenfishes (*Myctophidae*) etc.

2 Fisheries Data Collection and Research Activities

China Fisheries Association (CFA) and Shanghai Ocean University (SHOU) jointly take charge of the JM fisheries data collection and research activities. The fisheries data collection was supported by China fishing fleet cooperating and cooperated with the China 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.

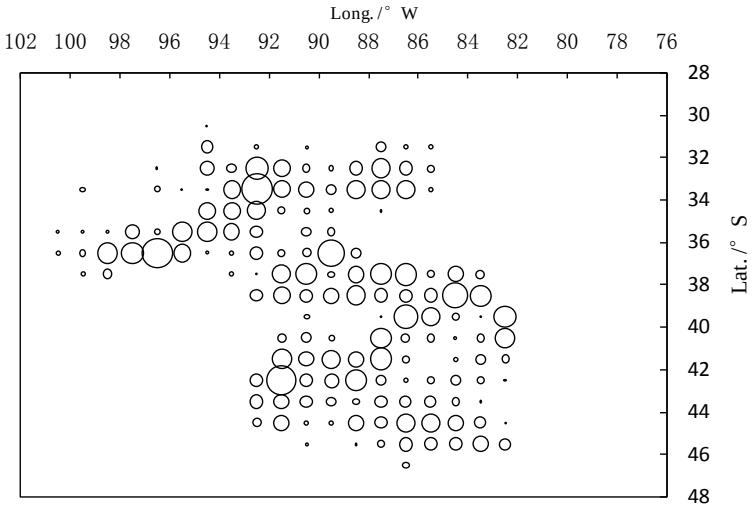

Fig 4 1°×1° Catches of CJM by Chinese fishing fleet in 2008 in Southeast Pacific Ocean (FAO Area 87)

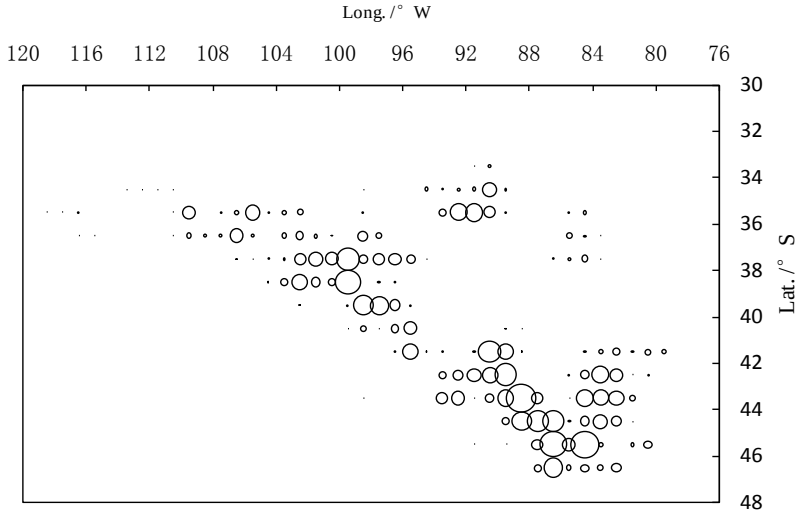

Fig 5 1°×1° Catches of CJM by Chinese fishing fleet in 2009 in Southeast Pacific Ocean (FAO Area 87)

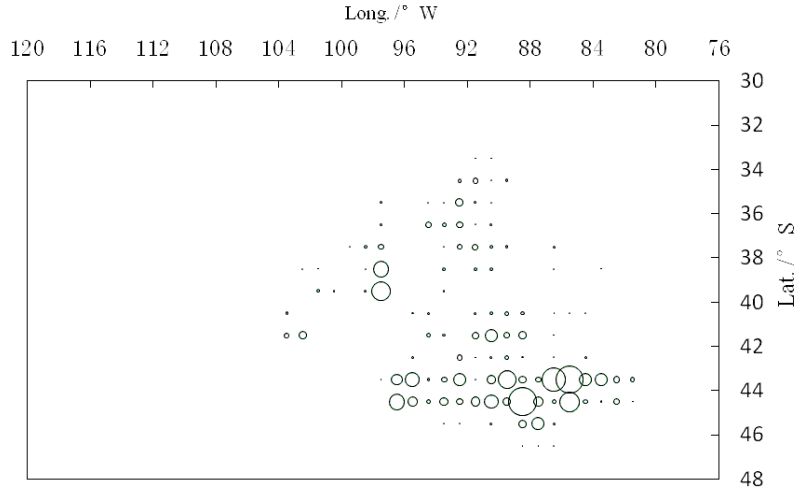

Fig 6 1°×1° Catches of CJM by Chinese fishing fleet in 2010 in Southeast Pacific Ocean (FAO Area 87)

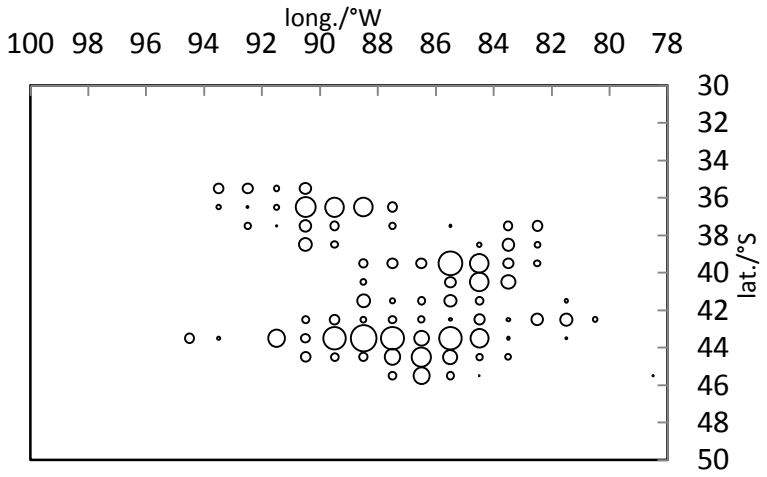

Fig 7 1°×1° Catches of CJM by Chinese fishing fleet in Mar. to Jun. 2011 in Southeast Pacific Ocean (FAO Area 87)

Biological items measured by means of the random sampling on broad are fork length, body height, width and girth, body weight and net weight with 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 CJM 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 CJM resource survey, stock assessment, DNA tests and so on.

3. Biological Sampling and Length / Age Composition of CJM

Altogether 18,776 CJM 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. 3,826 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.

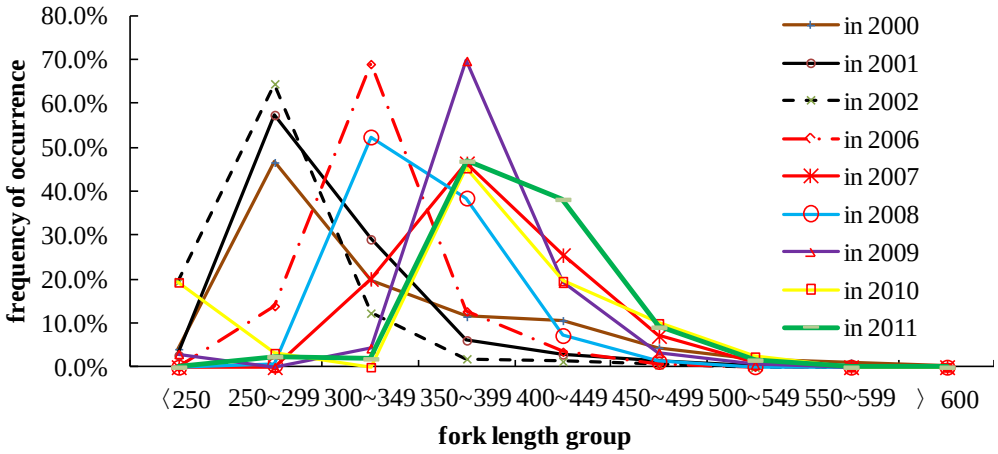

Fig8 Fork length composition of CJM

Table 3 Fork length (mm) composition of CJM

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%
2010	185	578	19.3%	3.2%	0.0%	45.3%	19.6%	10.0%	2.4%	0.1%	0.0%
2011	265	525	0.0%	2.4%	1.9%	46.9%	38.2%	9.1%	0.0%	2.4%	1.9%

Fork length composition of CJM is showed in fig 8 and table 3. It indicate that the dominant fork length of CJM increase gradually in recent years and decline from 2010.We also found that there are a large number small fish occurred near 39. 05°S, 101. 55°W and the average fork length is 216 mm (std. 14) in 2010.

The relationship between age and fork length of CJM in 2011 is showed in table4, fig.9.

Table 4 The relationship between age and fork length of CJM in 2011

sizeclass(FL/mm)								number
	3+	4+	5+	6+	7+	8+	9+	
270-280	1							1
280-290	2							2
290-300	4							4
300-310		1						1
310-320								0
320-330								0
330-340		1						1
340-350								0
350-360								0
360-370		3	1					4
370-380	1	21	2					24
380-390		22	22	4				48
390-400		25	23	8				56
400-410		20	30	5	1			56
410-420		5	20	7	1			33
420-430		4	16	6				26
430-440		1	8	6	1			16
440-450		1	10	6	1			18
450-460			8	7	2			17
460-470			5	7	1			13
470-480			1	5	2			8
480-490			2	3	2			7
490-500			1	1	2			4
500-510			1	2	1			4
510-520			1		1		1	3

520-530				1	2			3
number	8	104	151	68	17	0	1	349

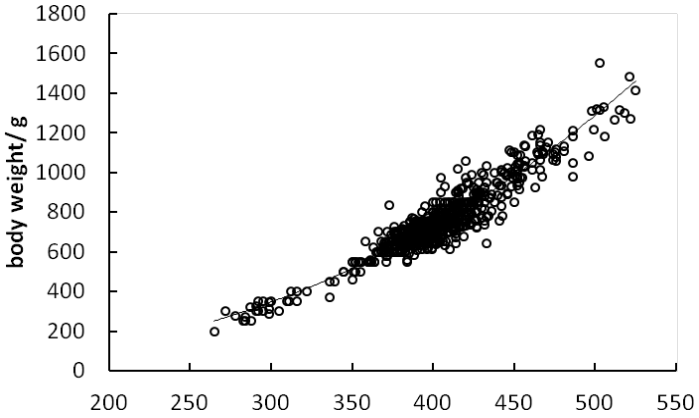

Fig. 9 Fork length-weight relationship for *Trachurus murphyi* in 2011, $W=1.4902*10^{-4}L^{2.5701}$ $R^2=0.90$

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 debuging, and related studies. The observer program has been continually under way since 2007. Each year, 2 or 3 of Chinese fishing vessels were dispatched the observers on boar, they are namely "Kai Xin", "Kai Fu", "Kaili" and "Fu Xing Hai" etc. The coverage rate of observers is more than 25-30%. So far the observers are still on board in 2012.