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1 Brief Introduction of China CJM Fishery

Description of China CJM fishery

The Chinese trawling fleets have harvested Chilean jack mackerel (CJM) in the high seas off Chile since 2000. The number of Chinese fishing vessels varied between 11 and 13 during 2004-2009, however the number of active vessels has decreased continuously since 2010. Only two vessels remained active in 2013 and 2014 (Tab.1).

Table 1 Number of vessels and size of the Chinese trawling fleets from 2004 to 2014

Year	Number of 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
2013	2	0	2	Pelagic trawl
2014	2	0	2	Pelagic trawl

Catch, effort and CPUE

In 2013, two Chinese fishing vessels harvested CJM in the South Pacific. The first fishing vessel, "*KAIFU HAO*", commenced its fishing activity in May and finished in August. The other vessel, "*KAILI*", arrived at the fishing ground in

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August and ended its fishing season in December. Total catches by these two vessels were 8,329 tons, which is the lowest level since 2001.

Table 2 shows the summary of annual catch, effort and CPUE of the China CJM fishery. Annual catch has fluctuated between 8,329 and 160,000 tons over the past 13 years. During the period of 2001-2006, annual catch increased stably and peaked in 2006. Annual catch began falling in 2007 and has declined sharply since 2010. Approximately 13,000 tons of CJM have been caught through the 31st July by the two Chinese fishing vessels.

Fishing days have decreased in recent years to below 1,000 days since 2010. Catch per fishing day peaked in 2006, but continued to drop for the next 7 years. Compared to previous years, catch per day may have increased in 2014.

Table 2 Catch, Effort and CPUE of CJM by Chinese fishing fleet

Year	Catch in tons	Fishing days	Catch per days in tons	Standardized CPUE (ton/hour)	Year effect (Exp. transformed)
2001	20,090	497	40	3.34	1.40
2002	76,261	1,477	52	4.98	1.97
2003	94,690	1,569	60	5.31	1.74
2004	131,020	2,271	58	4.21	1.44
2005	143,000	2,474	58	5.81	1.44
2006	160,000	1,811	88	6.84	1.02
2007	140,582	2,033	69	5.85	1.13
2008	143,182	17,23	83	6.76	0.86
2009	117,963	1,567	75	7.23	0.81
2010	63,606	921	69	4.42	0.57
2011	32,862	591	56	2.95	0.33
2012	13,012	260	50	2.92	0.37
2013	8,329	177	47	4.09	0.58
2014*	12,955	155	83	-	-

Note: The total catch of CJM was 12,955 tons through July 2014.

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In general, the year effects (exponential transformed) estimated by the general additive model (GAM) showed a declining trend in catch rates and reached the lowest level in 2011. However, year effect increased in recent three years and it increased to 0.58 in 2013, just above its level of 2010, and it may continue to grow in 2014.

The operational area of the Chinese trawling fleets extends from outside the Chilean EEZ to 120°W, e.g. in 2008 and 2009. Fishing operation was normally concentrated on the high seas off central Chile, from 30ºS to 45ºS and from 80ºW to 100ºW (Fig. 1). But in the last three years, the Chinese fishing vessels moved westward relative to the Chilean EEZ, especially in 2013 (Fig. 2). While annual catch decreased, catches from the high seas off North Chile increased over the last 2 years. For example, the ratio of catch from Northern Chile reached 36% in 2012 and 14% in 2013, respectively (Fig. 2). Although this trend was observed in the 2008 fishing season, the ratio was less than 1%.
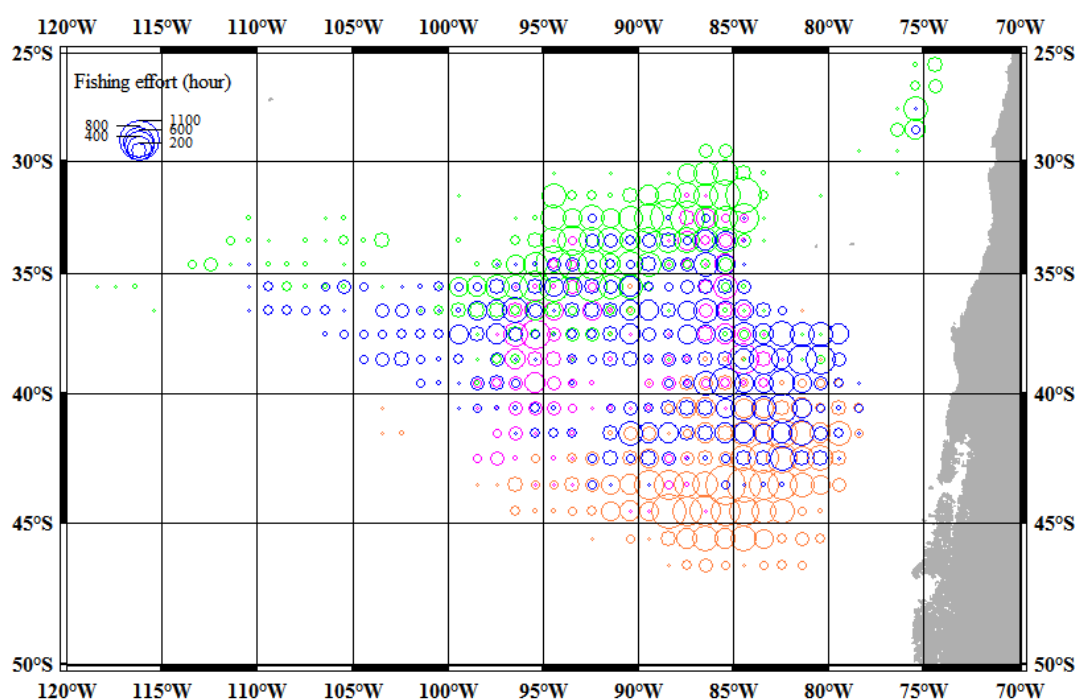

Figure 1 Seasonally fishing effort distribution (1°×1°) of the Chinese fleets in SPRFMO area in 2001-2012 (purple=summer, orange= fall, green=spring, blue=winter).

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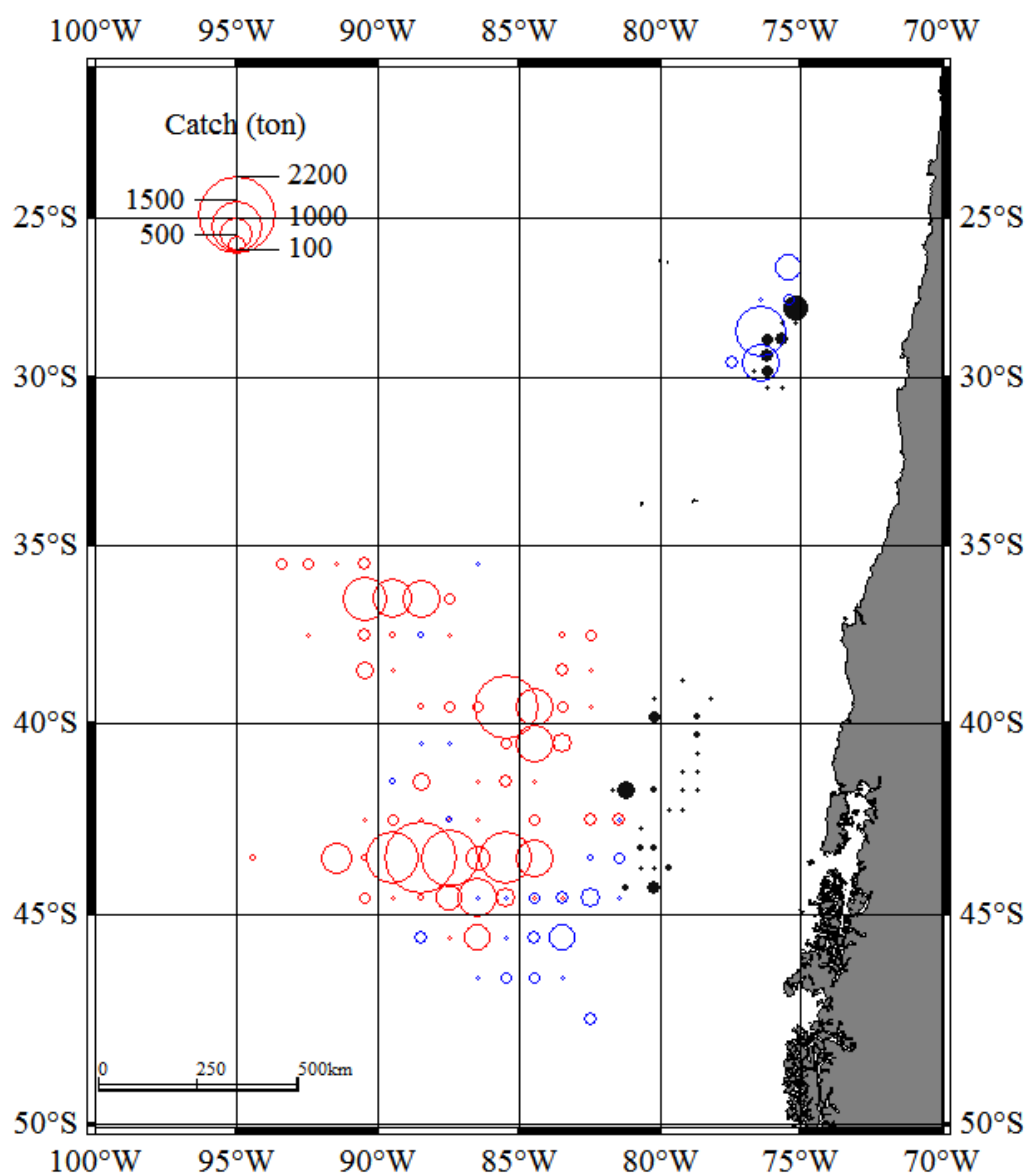
Figure 2   Spatial distribution (1°×1°) of CJM catch by the Chinese fleets in SPRFMO
area in 2011 (red circle), 2012 (blue circle) and 2013 (solid black circle)

2 Fisheries Data Collection and Research Activities

China Distant Water Fisheries Association (CDWFA) 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. The full log books collection program has been carried out since 2007 to be
delivered to SHOU for research purposes.

The biological data and environment data were measured and collected on
board by the scientific observers. The catch data were collected from log books

or directly recorded from the catch. Log book data mainly consist catch per tow, fishing duration, positions and towing speed. Environment data were also collected including wind direction and speed, SST, and STD.

Depth and temperature where fish school inhabited were recorded by the echo sounder, net sounder and sonar. Biological data measured by random sampling on broad include fork length (FL), body weight (BW), sex, maturity stage, food composition, and stomach fullness.

3 Biological Sampling

There was no sampling of CJM biological data conducted in 2013 because observers were unable to board the fishing vessels.

Based on the 4,000 CJM fork length data collected by observers in 2014, the length frequency information was obtained (Fig. 3). The range of fork length was from 271 to 530 mm, dictated by 331-400mm (70.05%).
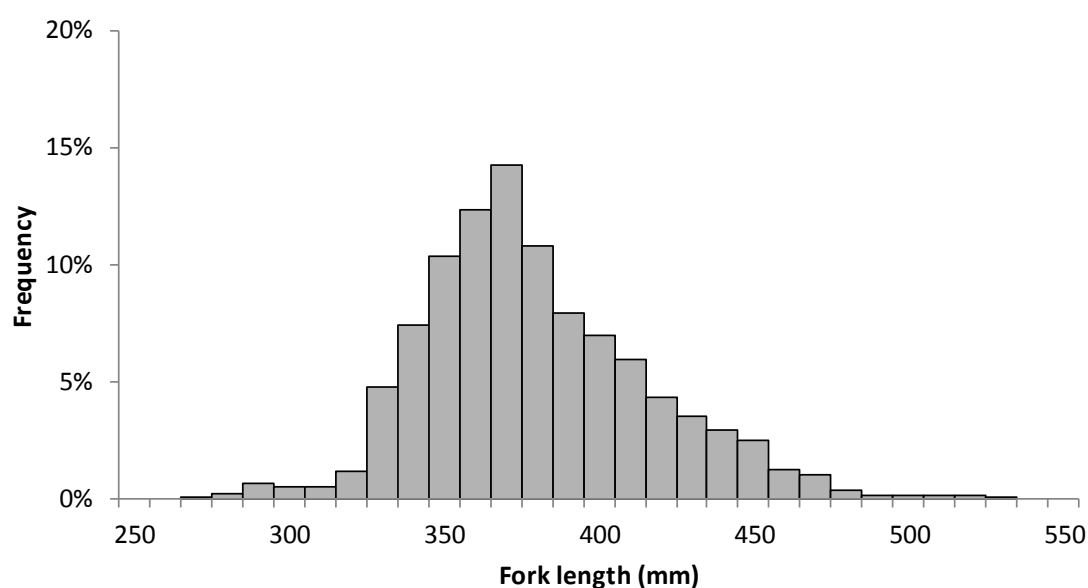

Figure 3 Fork length frequency of CJM in 2014

4. Fishery Scientific Observer Program

In order to implement "Standards for the collection, reporting, verification and exchange of data" of SPRFMO, China fishery Authority accredit SHOU for the training, selection and dispatch of observers. China had planned to dispatch

observers in 2013, but the observer cannot meet with the fishing vessel successfully because of transportation problem.