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Korea Annual report

Seokgwan Choi, Inja yeon, Jong Hee Lee & Dong Woo Lee

National report of Korea to 2nd Scientific Committee of SPRFMO

Seokgwan CHOI, Inja YEON, Jong Hee LEE and Dong Woo LEE (NFRDI)

1. Description of the fishery

Jack mackerel fishery

Korean research trawl fishery targeting for jack mackerel was commenced in 2003 using the R/V Tamgu No. 1 and two commercial mid-water trawl vessels. Since then the Korean commercial fishery for jack mackerel has operated in the fishing ground of outside EEZ until recent years. The number of active fishing vessels started with 3 in 2004, decreased to 2 in 2009, and remains at 1 from 2013 to 2014 (Table 1).

Table 1. Number of vessels and size for jack mackerel fishery of Korea in the SPRFMO area

Years	Number of vessels	Gross registered Tonnage			
		2,000-2,999	3,000-3,999	4,000-4,999	5000<
2004	3	1	1	1	-
2005	2	1	1	-	-
2006	3	1	1	1	-
2007	3	1	1	1	-
2008	3	1	1	1	-
2009	2	-	1	1	-
2010	2	-	1	-	1
2011	2	-	1	-	1
2012	2	-	1	-	1
2013	1	-	1	-	-
2014	1	-	1	-	-

Bottom fishery

Korean bottom trawl fishery for orange roughy was operated in high seas with 1-2 vessels during 2004-2007. There was no bottom trawl fishery in the SPRFMO area since 2008 (Table 2).

Table 2. Number of vessels and size for bottom fishery of Korea in the SPRFMO area

Years	Number of vessels	Gross registered Tonnage		
		600-699	700-799	800-899
2004	2	1	-	1
2005	-	-	-	-
2006	1	-	-	1
2007	1	-	-	1
2008	-	-	-	-

2. Catch, effort and CPUE summaries

Catches by species for jack mackerel fishery

Annual catches of jack mackerel and other species from 2004 to 2013 are summarized in Table 3 and Figure 1. In 2009, the catch was a peak with about 15 thousand tons. From 2010 to 2012, two Korean trawlers were operated in the SPRFMO area and caught individually 8,183 ton, 9,253 ton. In 2012, two trawlers were operated but only one vessel caught jack mackerel without bycatch and others. In 2013, only one trawler was operated, but the catch was similar to it in the last year.

Table 3. Catch by species for jack mackerel fishery of Korea in the SPRFMO area

Years	Number of fishing days	Total Catches (ton)	Catches (ton)		
			Trachurus murphyi	*Scomber japonicus*	Others
2004	205	8,146	7,438	708	-
2005	170	9,507	9,126	381	-
2006	232	11,934	10,474	1,460	-
2007	237	12,180	10,940	1,240	-
2008	249	13,568	12,600	968	-

2009	182	14,534	13,759	716	59
2010	136	8,267	8,183	84	-
2011	205	9,377	9,253	24	100
2012	117	5,492	5,492	-	-
2013	140	5,378	5,267	111	-

CPUE (ton/hr) trend of jack mackerel largely presents at the range of 4 to 6 tons without the highest value which was 10.5 tons in 2009 and a total of catch was 13,759 ton (Figure 1). Since 2010 the CPUE has remained relatively stable at the low level, 5 to 6 tons. In 2013, it was 5.4 tons.

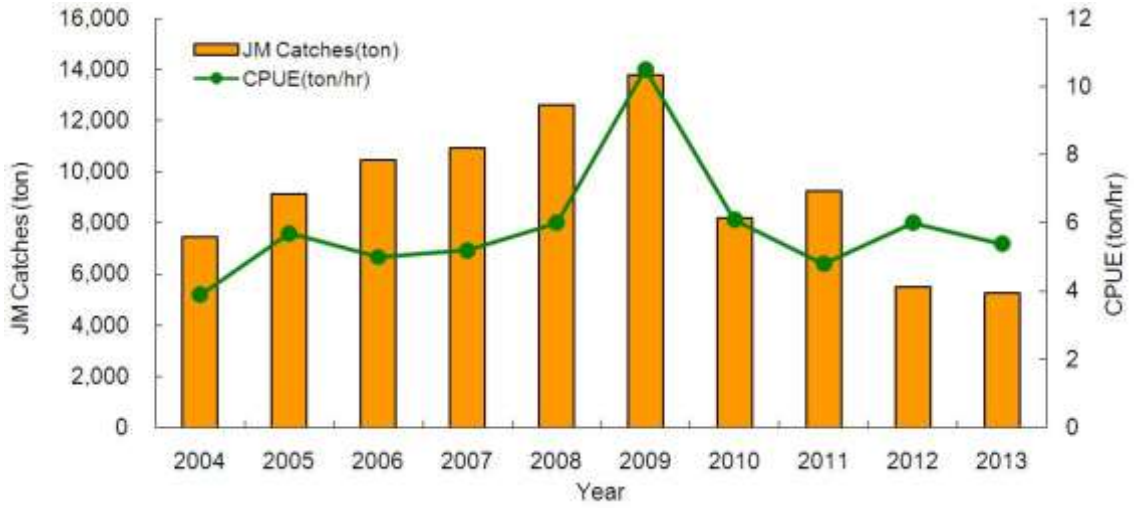

Figure 1. Trends of catch and CPUE (catch per unit effort; ton/hr) of jack mackerel by Korean fishing vessels in the SPRFMO area from 2004 to 2013.

Geographical distribution of the CPUE

Geographical distributions of the CPUE of jack mackerel by Korean fishing vessels from 2009 to 2013 are shown in Figure 2. In 2009, a total catch of jack mackerel was the highest and the distribution area of the CPUE was also the widest. Fishing operation for jack mackerel carried out mainly during March to August. The main fishing ground was revealed as the area of 35°-45°S, latitude and 80°-95°W, longitude. The fishing ground has become narrower and narrower by the year elapsed since in

2009. In 2013, the fishing ground shrank to the smaller area, 26°-44°S, latitude and 74°-82°W, longitude (Figure 2).

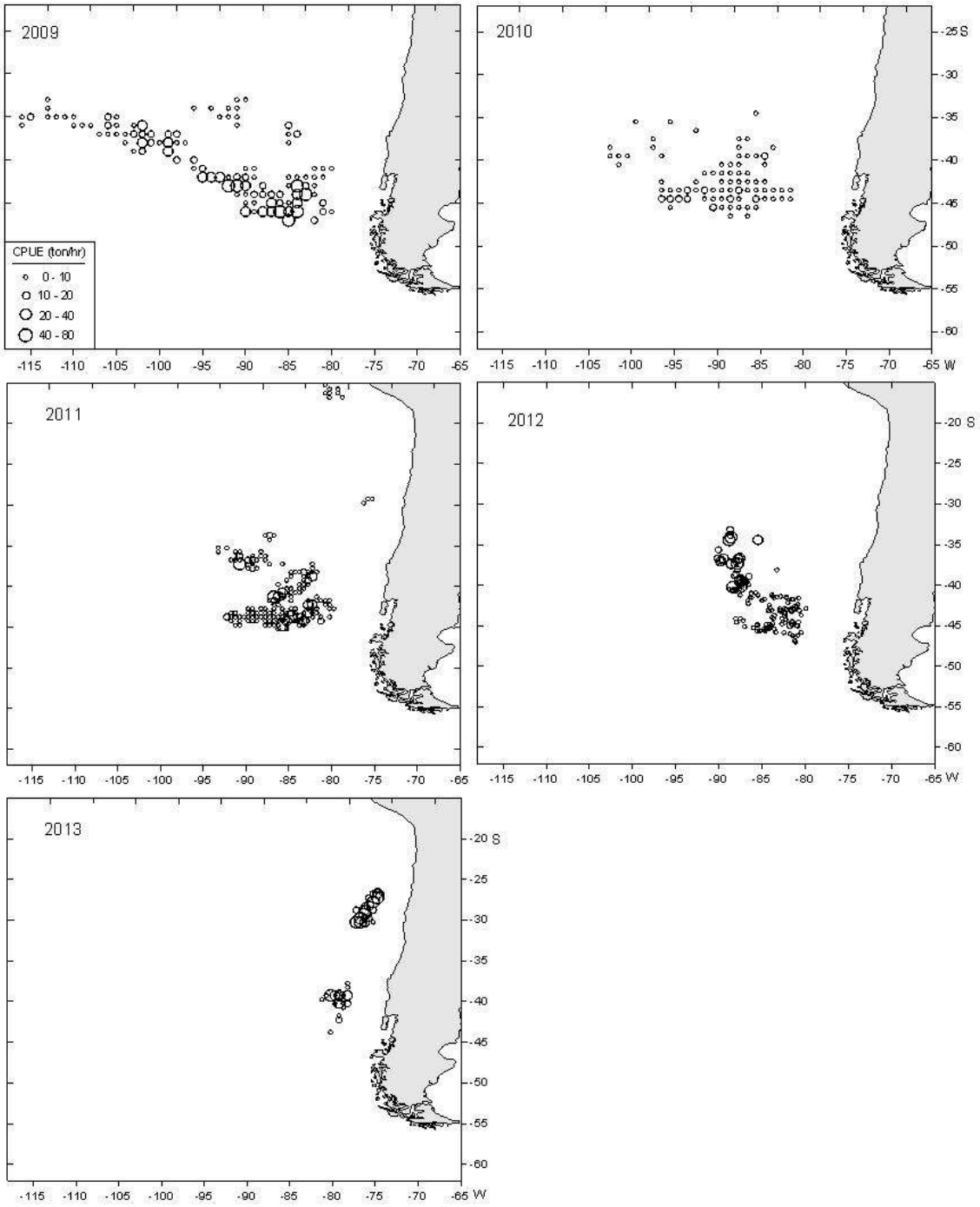

Figure 2. Distribution of CPUE (ton/hr) of jack mackerel of Korean fishing vessels in the SPRFMO area in 2009-2013.

Catches by species for bottom fishery

Table 4 represents total annual catches and fishing efforts (number of fishing days) for the Korean bottom trawl fishery during 2001-2007 in the SPRFMO area. The catch including orange roughy increased from 101 tons to 266 tons over 2001-2003, and it decreased to 49 tons over 2004-2007 shown the lowest value in 2007 (Figure 3).

Table 4. Annual catches for bottom fishery of Korea in the SPRFMO area

Years	Number of fishing days	Catches (ton)	Orange roughy (ton)	Others
2001	?	101.4	93.3	8.1
2002	?	225.0	207.8	17.2
2003	?	266.5	243.3	23.2
2004	51	143.8	137.9	5.9
2005	-	-	-	-
2006	32	83.1	77.2	5.9
2007	29	48.8	44.2	4.4

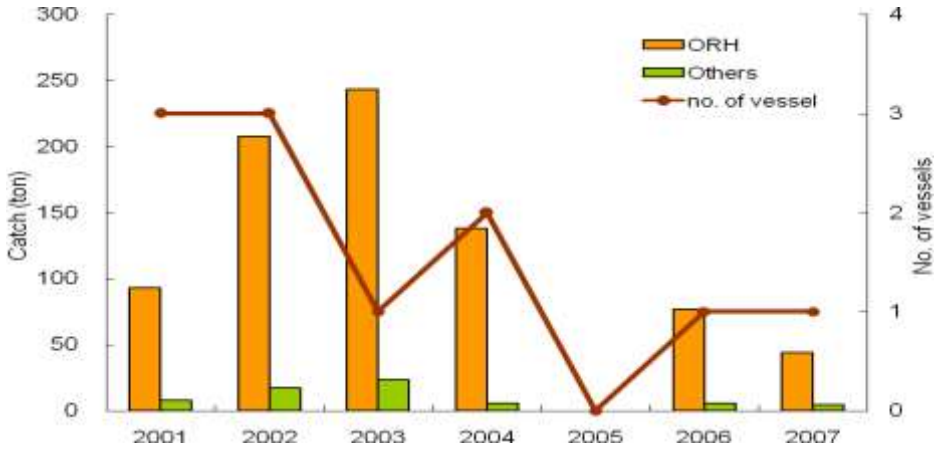

Figure 3. Trends of annual catch of orange roughy and number of fishing vessels by Korean bottom trawl fishery in the SPRFMO area in 2001-2007.

3. Fisheries data collection

Official catches by distant-water fishery is obtained by two organizations. Korea Overseas Association (KOFA) collects total catches by gear type from Korean distant-water fishery industries, which are used as Korean official total catch. National

Fisheries Research and Development Institute (NFRDI) collects logbook data from sampled fishing vessels. The logbook contains daily catch and effort data on the basis of tow-by-tow.

Data collection from the vessel

Each commercial vessel of distant-water fisheries submits the "Catch Report and Biological Report (logbook)" which are recorded on board of fishing vessels according to the domestic regulation on the tow-by-tow basis. The logbook and catch data have been submitted to the SPRFMO Secretariat in accordance with the data standards of SPRFMO.

Data collection by observer at the sea

For the analysis of the biological characteristics for jack mackerel, an observer collects fork length, body weight, by sex and reproduction indices from the commercial vessels. In 2008, two Korean vessels operated in the SPRFMO area and one observer was deployed for 9 days. The coverage rate of observation was 4 %. And also Korean vessels operated in 2010, but no observer was deployed on these trips. In 2011, one observer embarked on one vessel from August 15 to September 5, and the coverage rate of observation was 6.8 %. In 2012, one observer operated on one vessel from April 22 to July 28, and the coverage rate of observation was 58.1 %. In 2013, two observers, respectively in different period, on the vessel conducted data collections from June 25 to November 10 and on December 29, so the coverage rate of observation was 100 % (Table 5).

Table 5. Dispatch of scientific observers of Korean fishing vessels in 2008, 2011, 2012 and 2013 in the SPRFMO area

Date	Vessel name	observed days	Coverage rate (%, tows)
2008. 10	Insungho	3	4
	Kwangjaho	6	
2011. 8-9	Kwangjaho	14	6.8
2012.4-7	Kwangjaho	68	58.1
2013.6-12	Kwangjaho	140	100

4. Biological sampling and length composition of Chilean jack mackerel

In October 2008, a total of 344 jack mackerel was measured. The range of fork length was 32 cm to 49 cm with the average length 37.8 cm. There was only one group with one mode at 38 cm (Fig. 4). The relationship equation between body weight (g) and fork length (cm) was $BW=0.073FL^{2.46}$ ($R^2=0.876$, Fig.5).

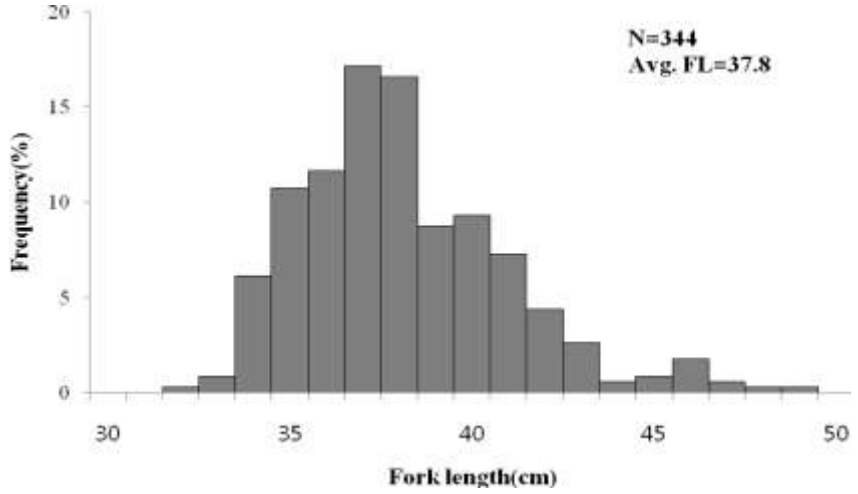

Figure 4. Frequency of fork length of jack mackerel caught by Korean fishing vessel on October 2008 in the SPRFMO area.

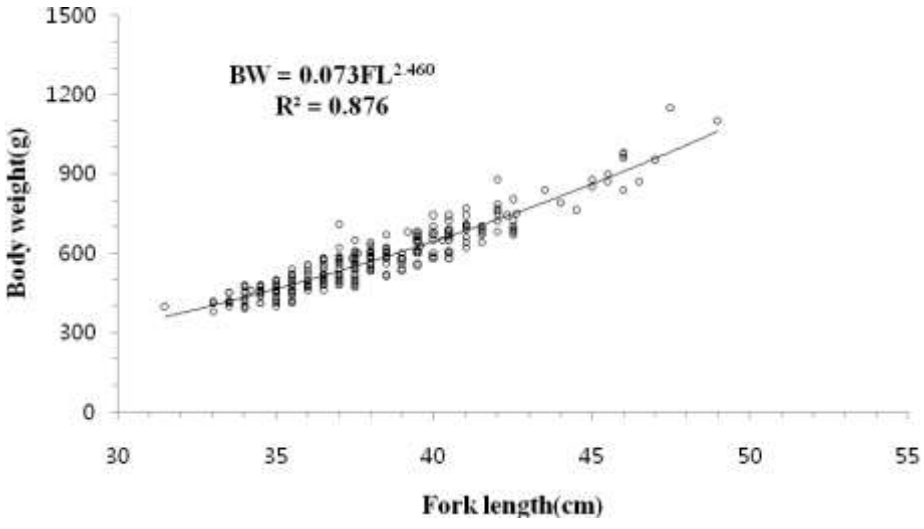

Figure 5. Relationship between body weight and fork length of jack mackerel caught by Korean fishing vessel on October 2008 in the SPRFMO area.

In August and September 2011, a total of 2,450 jack mackerel was measured. The range of fork length was 28 cm to 69 cm, and the average was 45.6 cm. There were two separate groups with two modes at the 33 cm and 45 cm, respectively. The small group in the smaller length seemed like a new recruitment (Fig. 6). The relationship equation between body weight (g) and fork length (cm) was $BW=0.02FL^{2.76}$ ($R^2=0.949$, Fig. 7).

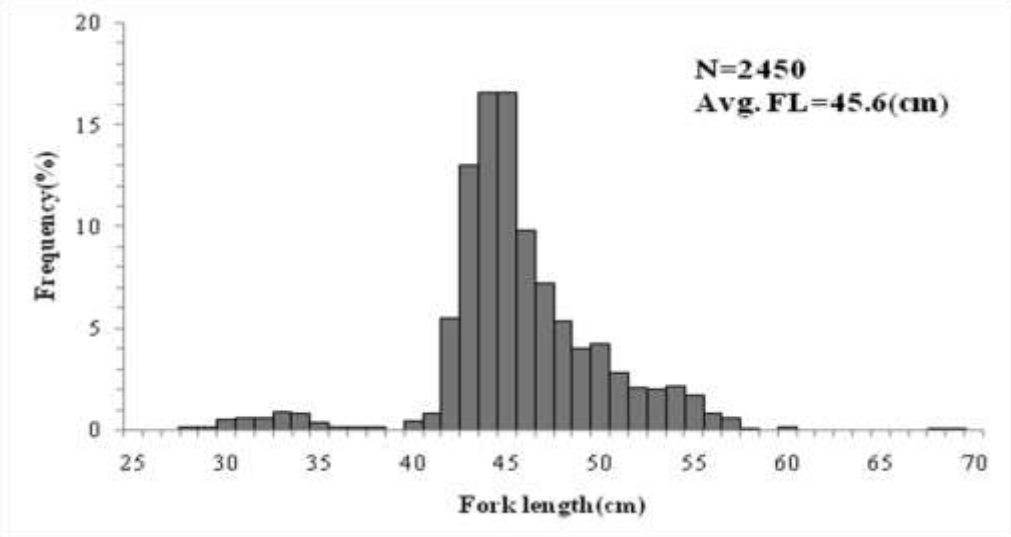

Figure 6. Frequency of fork length of jack mackerel caught by Korean fishing vessel on August-September 2011 in the SPRFMO area.

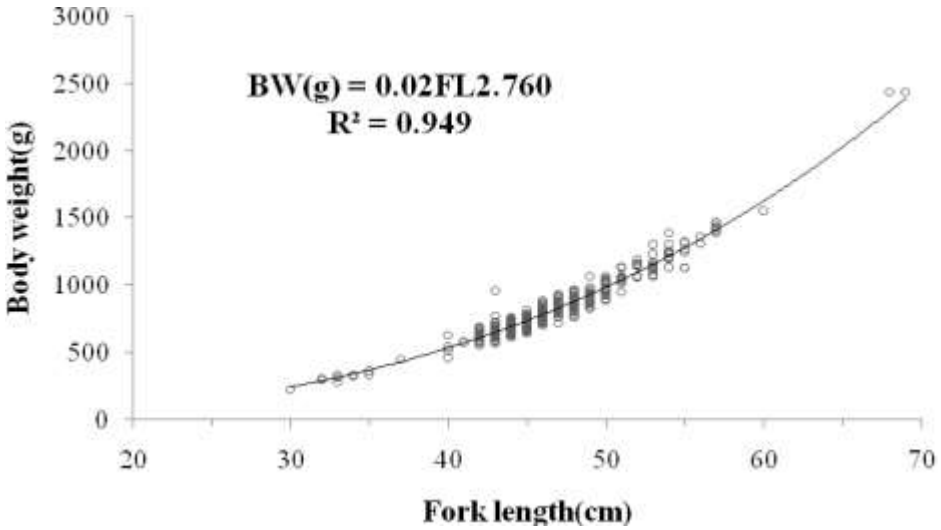

Figure 7. Relationship between body weight and fork length of jack mackerel caught caught by Korean fishing vessel on August-September 2011 in the SPRFMO area.

In April to July 2012, a total of 9,789 jack mackerel was measured. The range of fork length (FL) was 31 cm to 60 cm, and the average FL was 48.6 cm. There was only one group with one mode at 48 cm (Fig. 8). The relationship equation between body weight (g) and fork length (cm) was $BW=0.016FL^{2.820}$ ($R^2=0.924$, Fig. 9).

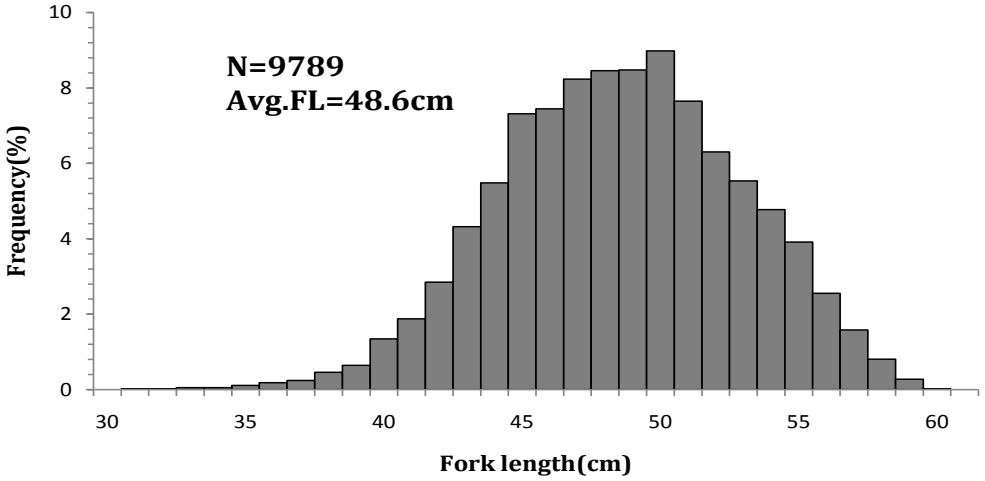

Figure 8. Frequency of fork length of Chilean jack mackerel caught caught by Korean fishing vessel on April to July 2012 in the SPRFMO area.

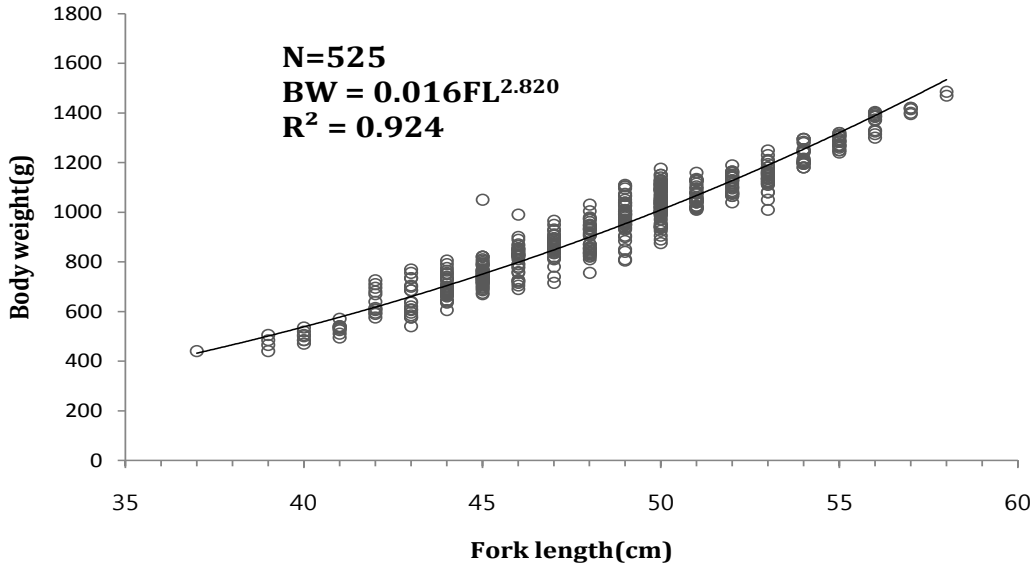

Figure 9. Relationship between body weight and fork length of Chilean jack mackerel caught caught by Korean fishing vessel on April to July 2012 in the SPRFMO area.

In June to August 2013, a total of 3,085 jack mackerel was measured. The range of fork length (FL) was from 20 cm to 54 cm, and the average FL was 29.7 cm. Length class with 30 cm was the highest frequency but modes was not clearly separated (Fig. 10). The relationship equation between body weight (g) and fork length (cm) was $BW=0.035FL^{2.732}$ (R^2=0.925, Fig. 11).

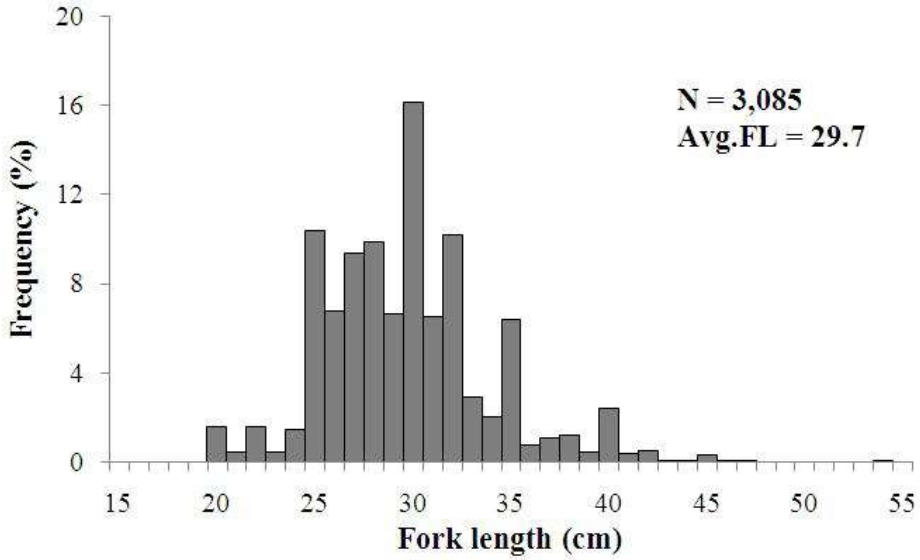

Figure 10. Frequency of fork length of Chilean jack mackerel caught caught by Korean fishing vessel on June to August 2013 in the SPRFMO area.

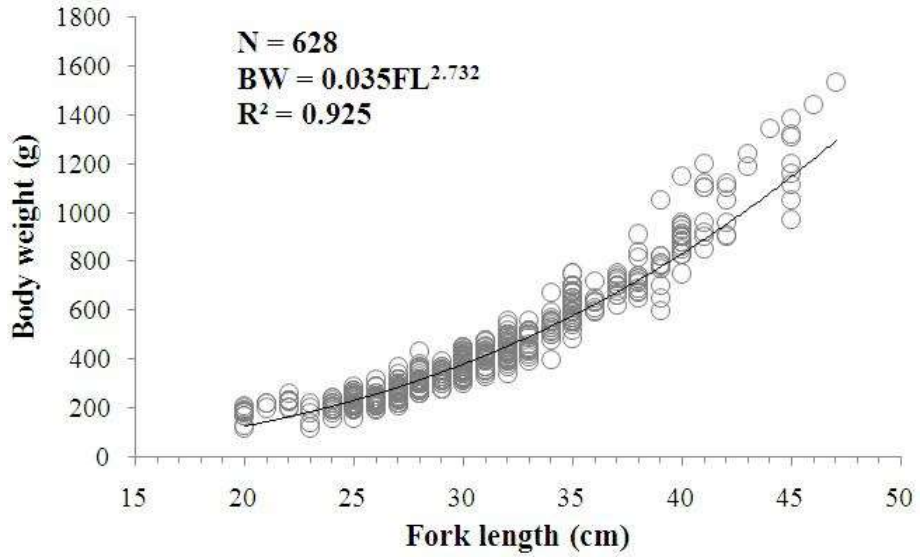

Figure 11. Relationship between body weight and fork length of Chilean jack mackerel caught caught by Korean fishing vessel on 2013 in the SPRFMO area.