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NATIONAL REPORT OF THE REPUBLIC OF KOREA

(Distant Water Fisheries Resources Division)

National Institute of Fisheries Science
216 Gijanghaean-ro, Gijang-eup, Gijang-gun, Busan 46083, Republic of Korea

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Summary

Korea distant water fishery has two types of fishing gears, purse seine and longlines, that engage in fishing for tuna and tuna-like species in the north Pacific. Total number of active longline vessels showed a stable pattern from 122 vessels in 2010 to 125 in 2013, however, it decreased to 96 in 2016. Total number of active purse seine vessels showed a constant trend during 2010-2014 and has slightly decreased to 25 in 2015 and 2016. Total catch of tuna and tuna like species caught by Korean distant water fisheries in the north Pacific was 84,586 ton in 2016. Total catch of longline was 10,593 ton, which is 53.4 % of the historical highest catch in 2004. That of purse seine was 73,993 ton, which is corresponding to 73.5% of the historical highest catch in 2003. As for the catch composition of longline fishery, dominant species were bigeye, which is over 65% of the total catch, yellowfin and blue marlin for 15% and 10%, respectively. As for that of purse seine fishery, skipjack, yellowfin and bigeye tuna were 85%, 13%, and 1%, respectively. Pacific bluefin tuna (PBF) caught by offshore large purse seine fishery in the Korean EEZ was 1,029 ton in 2016. It was mainly distributed in the South Sea around Jeju Island throughout the year with the highest on March. The large PBF (30kg or larger than 30kg) was 46% of the total PBF and most of large PBF was caught during only 2 days on March. 1,045 tissue samples of PBF were collected for close-kin analysis in 2016 and 348 samples were collected in 2017.

1. Introduction

About a 60 year-old Korean distant water tuna longline fishery that commenced the first fishing in the Indian Ocean in 1957, has explored the Pacific Ocean since 1958 and the Atlantic Ocean since 1967. Korean longline fishery has been mainly conducting in the waters of coastal states and the high seas of the south Pacific Ocean (SPO). In early days, Korean longline vessels used foreign ports in which are near the fishing grounds. However, as it was able to equip with deep freezing facilities in the vessels, fishing base started to move to Korean domestic ports since 1972. And since 1999, all longline vessels have been based on domestic ports. This change gave advantages in exporting the products to Japanese markets and others. In domestic markets, tuna sashimi demands have been increasing year by year.

The Korean tuna purse seine fishery was initiated by accessing into the eastern Pacific Ocean (EPO) with 3 vessels in 1971. Helicopter-aided mass operations were introduced in 1979 for the first time, and the number of active vessels was the highest of 39 in 1990 and sharply decreased to 27-28 during the early of 1990s and then maintained the level, but decreased to 25 in 2016. Most of the catches were supplied to the packers for domestic consumption, and rest of them were exported to foreign canneries.

Both fisheries are managed by the Distant Water Fisheries Development Act put into effect on 4 February 2008, and the act was revised for improving the data collection on 5 December 2012 and implementing electronic data reporting system on 7 July 2015. Currently, over 80% of total catch of tuna and tuna-like species has occurred in the western and central Pacific Ocean (WCPO).

PBF has been caught by domestic fleet, mostly the offshore large purse seine fishery, which targets pelagic species such as mackerels operating within the Korean EEZ. The catch data and fishing information on this species had been rarely available until 2009 when the WCPFC adopted the CMM 2009-07. After then fisheries for PBF in the Korean EEZ have been managed under the Ministerial Directive put established on 26 May 2011. To strengthen management of PBF in Korea, the Ministerial Directive was revised on 29 December 2014. Accordingly, the catch limit of PBF has been set, and catch reporting system has improved as well. This report provides the information on the Korean distant water fisheries for all high seas and PBF catches by domestic fleets in the Korean EEZ.

2. Fisheries

2.1 Distant water fisheries

2.1.1 Fleet structure

The north Pacific Ocean (NPO) is an integral part of the fishing ground for Korean distant water fisheries belonging to the WCPFC and the IATTC convention areas of south of 20°N. All the vessels registered to both RFMOs could engage in fishing for tuna and tuna-like species in the NPO. The number of active vessels by gear and size is presented in Fig. 1 and Table 1. The number of active purse seine vessels, once peaked at 39 in 1990, reduced to 28 up to 1996 and had been maintained around 26-28 until 2014. In 2016, it decreased to 25, of which 7 vessels were 501-1,000 GRT class, 14 vessels of 1,001-1,500 GRT class and 4 vessels of over 1,500 GRT class. The number of active longline vessels reduced from 220 in 1991 to 108 in 2008, and slightly increased and ranged from 111 to 126 thereafter. In 2016, it further decreased to 96, of which 1 vessel was 51-200 GRT class and 95 vessels of 201-500 GRT class.

2.1.2 Annual catch and effort

Annual catch and effort by gear and species in the NPO are tabulated in Tables 2, 3, and Figs. 2 and 3. Most of catch caught by longline and purse seine fisheries occurred in the areas of south of 20°N. Longline catch was 10,593 ton in 2016, which decreased 53.4% of the peak in 2004. Purse seine catch was 73,993 ton in 2016, which decreased 73.5% of the peak in 2003. As for the catch proportion by species caught by longline in 2016, bigeye, yellowfin, blue marlin and swordfish were 64.9%, 15.4%, 10.5%, and 5.5%, respectively. Bigeye catches slightly increased from 6,132 ton in 2015 to 6,871 ton in 2016, especially blue marlin in 2016 was highly increased compared to previous years. For purse seine, skipjack, yellowfin and bigeye tuna were 84.9%, 13.6 % and 1.4%, respectively. Skipjack catch in 2016 was 73.5% of the peak in 2003 and yellowfin catch in 2016 was 35.3% of the peak in 1993. Fishing effort of longline was 26,241 thousand hooks in 2016. That of purse seine decreased from 2,876 sets in 2003 to 2,379 sets in 2016.

The distributions on catch of target species and effort by gear are shown in Figs. 4 and 5. Korean tuna purse seine fishery has generally been operating throughout the year in the tropical area of the WCPO between 140°E-170°W and from time to time extended to the east subject to oceanographic conditions. Purse seine fishing efforts in 2012 and 2013 were concentrated on the western areas, while concentrated relatively higher on the central areas in 2014. Especially, in 2015 the distributions of effort moved eastward further and concentrated on the eastern areas than previous years. However, in 2016, the effort has moved back to central area. Korean tuna longline fishery efforts were normally higher in both the central and eastern Pacific Ocean. The efforts in 2014 concentrated in the WCPO, but those of 2015 and 2016 were relatively higher in the EPO

2.2 PBF catch by coastal fisheries

2.2.1 Fleet structure

PBF is mainly caught by offshore large purse seine (OLPS) fishery, which targets mackerels in the Korean EEZ. The number of offshore large purse seiners was 24 in 2015, continuously decreasing from 48 in 1994 due to fishing capacity control by the government. PBF is also caught by set net, troll and trawl fisheries as incidental.

2.2.2 Annual catch and effort

The annual and monthly catches of PBF are presented in Table 4 and Figs. 6 and 7. The catch increased from 676 ton in 2015 to 1,029 ton in 2016 because of increasing catch proportion of large PBF (30kg or larger than 30kg), which accounted for around 46% of total PBF in 2016. The catch of PBF by set net and offshore trawl fisheries were 3 t and 2 t, respectively.

According to the historical catches, there was no catch of large PBF prior to 2008. However,

adult PBF has been continuously caught in the coastal waters of Korea in recent years, it even accounted for over 46% of total PBF catch, which is 469 t in 2016.

PBF catches throughout the year with the highest from March to July, even though monthly peak of catch was slightly different on an annual basis. It was less than 10 t in average caught from August to November during the past 5 years.

The catches were concentrated around Jeju Island in the South Sea throughout the year (Fig. 8). The main fishing season was on March in 2015 and 2016. The fishing ground was the area of 32-35°N, 126-131°E with some seasonal fishing ground shifts.

The mean fork length in 2015 and 2016 were 53.4cm and 74.4cm, respectively (Fig. 9). Quarterly fork length frequency of PBF by OLPS is presented in Fig. 10. In the first quarter, it showed three modes which are 45cm, 80cm and 115cm, and some samples were shown over 200cm. However, the length distribution from the second to fourth quarter was focused on the range of 40cm-60cm. Most PBF caught by other coastal fisheries were juvenile.

3. Data collecting system

3.1 Distant water fisheries

Korean tuna catch statistics are obtained from two sources of data reporting. The Korea Overseas Fisheries Association (KOFA) collects monthly catch by gear and species from Korean tuna industries. The National Institute of Fisheries Science (NIFS) collects logsheet data from vessels filled out by captain onboard. In accordance with data reporting and submission requirement by RFMOs, necessary improvements related to logbook coverage and data quality have been continuously made, and all catch data are verified through cross-checking between NIFS and KOFA. To improve fisheries database management system and data cross-checking, in 2015 the NIFS and the Ministry developed an electronic logbook system capable of monitoring the state of data submission from fishing vessels in real time to manage/cross-check the data.

3.2 Observer program

The scientific observer program of Korean distant water fisheries was started in 2002. The NIFS is responsible for implementing and developing the program. The basic requirement for observers is college graduate with major in nature science or fisheries high school graduate with at least 1-year experience on board and certificate of qualification to deck officer. Candidates for observer, who have passed the paper review (including medical check) and oral interview, have to take three-weeks training program. Observer training program includes basic safety training for seafaring, operations of navigation devices, biological information training

on target and non-target species and data collecting/reporting method for fishing activities. During the training program, they have two kinds of test. One is for a technical term of fisheries and biology, and the other is for species identification. The person who scored 70% out of 100 points in the two tests and attended 100% of the course timetable can be qualified for a scientific observer and deployed on board. Korea has a total of 31 scientific observers at present.

3.3 PBF catch by coastal fisheries

The catch data of PBF for 1982-1999 were from the import products information recorded by Japan, those for 2000-2004 were from the export data to Japanese markets obtained from Korean offshore large purse seine fisheries cooperatives. Since 2005, monthly sale slips of Busan Cooperative Fish Market compiled by the NIFS were used as PBF catch data. Of them, 2000-2008 were revised based on the box weight (Yoo et al., 2011; Yoo et al., 2012). Unfortunately, the historical catch data of PBF has uncertainty due to lack of reporting system.

4. Research

4.1 Tissue sampling for close-kin analysis

The NIFS has collected 1,045 tissue samples of PBF for close-kin analysis in 2016 and 348 samples were collected in 2017. The distribution of fork length was 32–179 cm in 2016 and 36 – 90 cm in 2017. Large PBF (FL 115 cm<) was sampled 7 fishes on March in 2016, but main size frequency (about 80% of total samples) showed in the range of 40-50 cm FL.

4.2 Research cruise

The research cruise had been carried out 6 times from 2010 to 2014 and 2016 to collect the larvae and juveniles of PBF, and some larvae and juveniles of albacore, skipjack and longtail tuna were collected from these researches as well.

References

Yoo J.T., Z.G. Kim, K. Choi, S. Kang, J.B. Lee, S.I. Lee, D.N. Kim, K.J. Seok, D.Y. Moon and D.W. Lee. 2011. Update of Pacific bluefin tuna catch in Korea waters. ISC/11-1/PBFWG/15

Yoo J.T., Z.G. Kim, S. I. Lee, I. J. Yeon, S. C. Yoon and D.W. Lee. 2012. Recent update of Pacific bluefin tuna catch in Korea waters. ISC/12-1/PBFWG/19.

Table 1. The number of active vessels and size by the Korean distant water tuna fishery operating in the Pacific Ocean, 2008-2016

Year	GRT class by fishery									
	Longline					Purse seine				
	Total	0-50	51-200	201-500	500+	Total	0-500	501-1000	1001-1500	1500+
2008	108	-	-	108	-	28	-	15	12	1
2009	111	-	-	111	-	27	-	13	11	3
2010	122	-	-	122	-	28	-	13	13	3
2011	124	-	-	124	-	28	-	12	11	5
2012	126	-	-	126	-	28	-	12	11	5
2013	125	-	1	124	-	27	-	12	10	5
2014	110	-	1	112	-	28	-	10	13	5
2015	98	-	1	97	-	25	-	7	13	5
2016	96	-	1	95	-	25	-	7	14	4

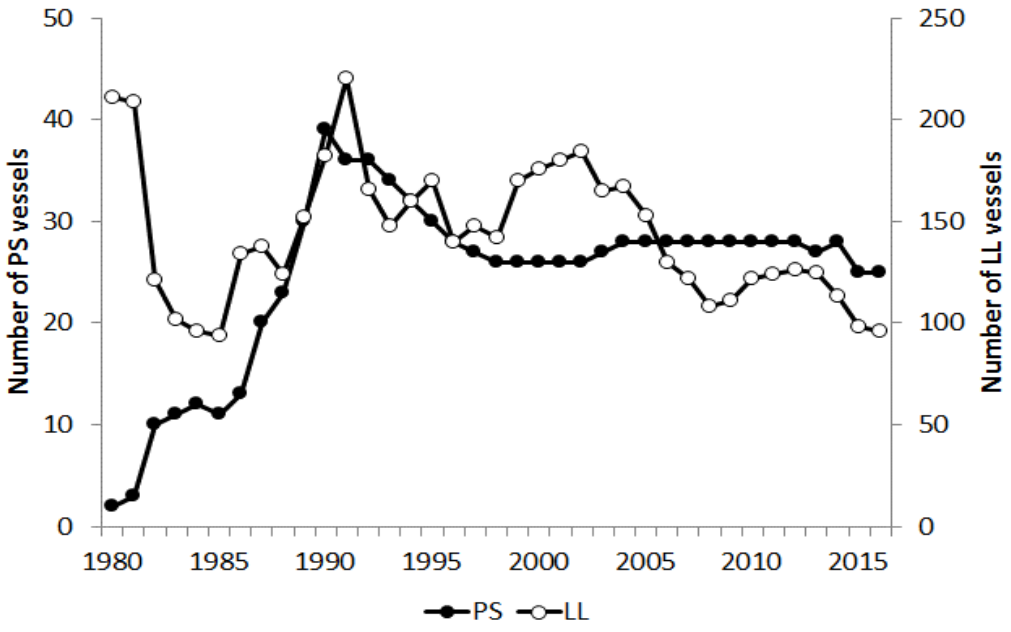

Fig. 1. Historical number of active vessels by the Korean distant water tuna fishery operating in the WCPFC Convention Area during 1980-2016.

Table 2. Number of hooks (1,000 hooks) and catch (t) of tuna and tuna-like species by the Korean tuna longline fishery in the north Pacific Ocean, 2002-2016. Data for 2016 is provisional

Year	Hook (X1000)	ALB	YFT	BET	SKJ	BUM	MLS	SWO	BLM	SFA	SKH	OTH	Total
2002	16,478	112	3,137	10,786	0	152	188	439	479	123	185	1,400	17,001
2003	21,431	146	4,741	9,739	6	159	206	381	819	129	95	931	17,352
2004	18,746	78	5,144	12,453	101	227	75	410	919	1	8	404	19,819
2005	14,955	420	2,958	9,257	35	304	136	404	997	0	10	820	15,340
2006	18,259	135	5,096	11,494	0	217	56	465	1,063	0	0	941	19,468
2007	15,441	137	2,175	9,606	0	121	47	453	887	0	1	291	13,718
2008	16,466	400	2,730	11,075	0	220	30	795	748	0	4	741	16,742
2009	13,286	95	2,992	10,979	0	224	23	994	654	0	13	878	16,852
2010	14,729	107	2,011	9,303	0	257	18	663	570	0	69	532	13,531
2011	16,654	78	3,146	9,047	0	684	48	962	159	1	546	941	15,614
2012	15,553	157	2,398	11,385	8	587	34	856	57	1	499	876	16,859
2013	13,780	173	1,988	6,041	22	963	65	1,071	41	2	735	204	11,306
2014	11,646	116	2,102	7,735	50	801	82	829	31	3	610	256	13,208
2015	8,022	38	1,520	6,132	41	531	44	776	82	2	250	115	9,531
2016	26,241	56	1,626	6,871	73	1,116	61	582	30	11	9	158	10,593

ALB : Albacore tuna, YFT : Yellowfin tuna, BET : Bigeye tuna, SKJ : Skipjack tuna, BUM : Blue marlin, MLS : Striped marlin, SWO : Swordfish, BLM : Black marlin, SKH : Sharks, OTH : Others

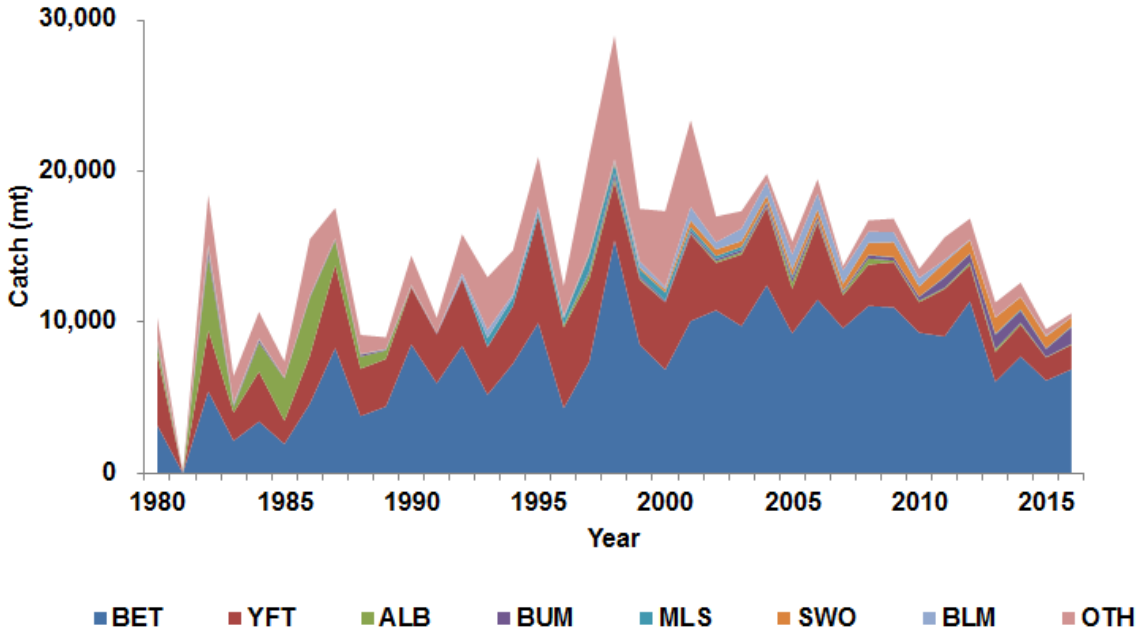

Fig. 2. Historical catch by species caught by Korean tuna longline fishery in the north Pacific

Ocean, 1980-2016.

Table 3. Fishing effort (sets) and catch (t) of tunas by the Korean tuna purse seine fishery in the north Pacific Ocean, 2002-2016. Data for 2016 is provisional

Year	Effort (sets)	Catch (ton)				Total
		SKJ	BET	YFT	OTH	
2002	2,537	64,897	0	16,389	0	81,286
2003	2,876	88,654	319	11,714	0	100,687
2004	1,633	43,797	48	7,426	0	51,271
2005	1,035	49,724	0	11,027	0	60,751
2006	510	67,564	13	15,394	0	82,970
2007	543	18,270	0	3,585	0	21,855
2008	490	9,233	4	7,842	0	17,079
2009	1,237	38,436	15	7,232	0	45,683
2010	727	20,751	374	4,020	0	25,145
2011	770	18,331	216	5,256	0	23,803
2012	2,402	67,448	404	19,467	1	87,320
2013	1,644	40,809	232	4,344	0	45,386
2014	1,732	40,690	265	11,343	0	52,298
2015	1,296	40,195	739	13,859	0	54,793
2016	2,379	62,849	1,025	10,088	31	73,993

SKJ : Skipjack tuna, BET : Bigeye tuna, YFT : Yellowfin tuna, OTH : Others

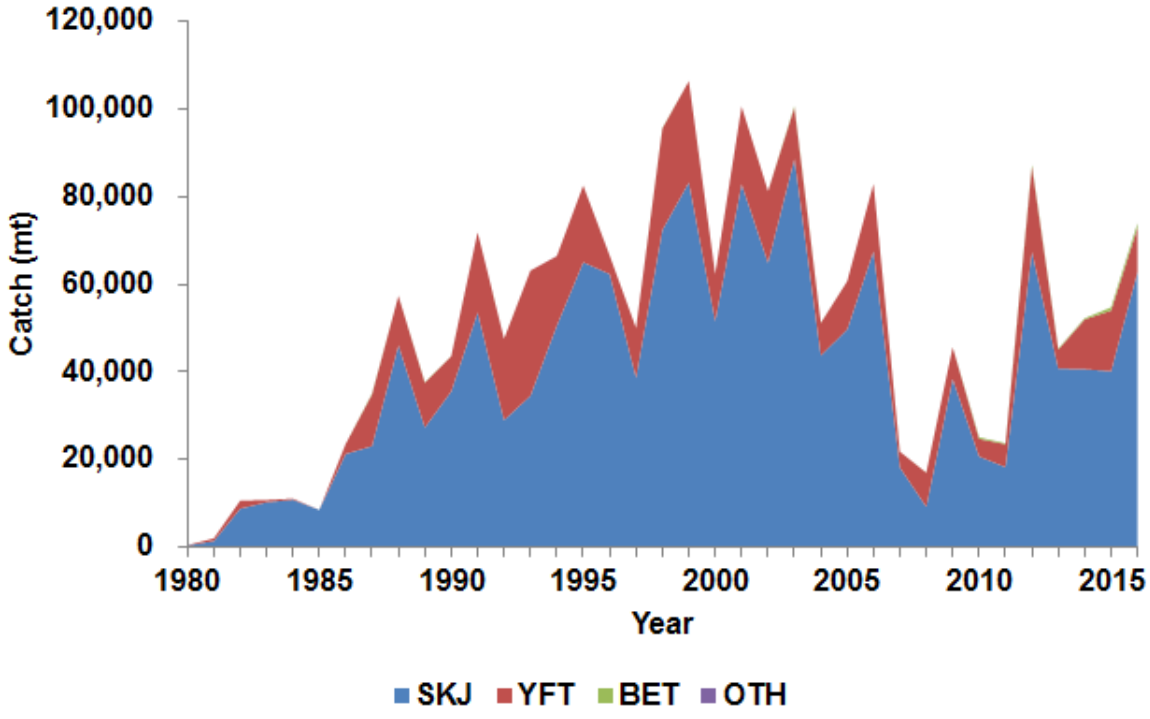

Fig. 3. Historical catch by species caught by the Korean tuna purse seine fishery in the north

Pacific Ocean, 1980-2016.

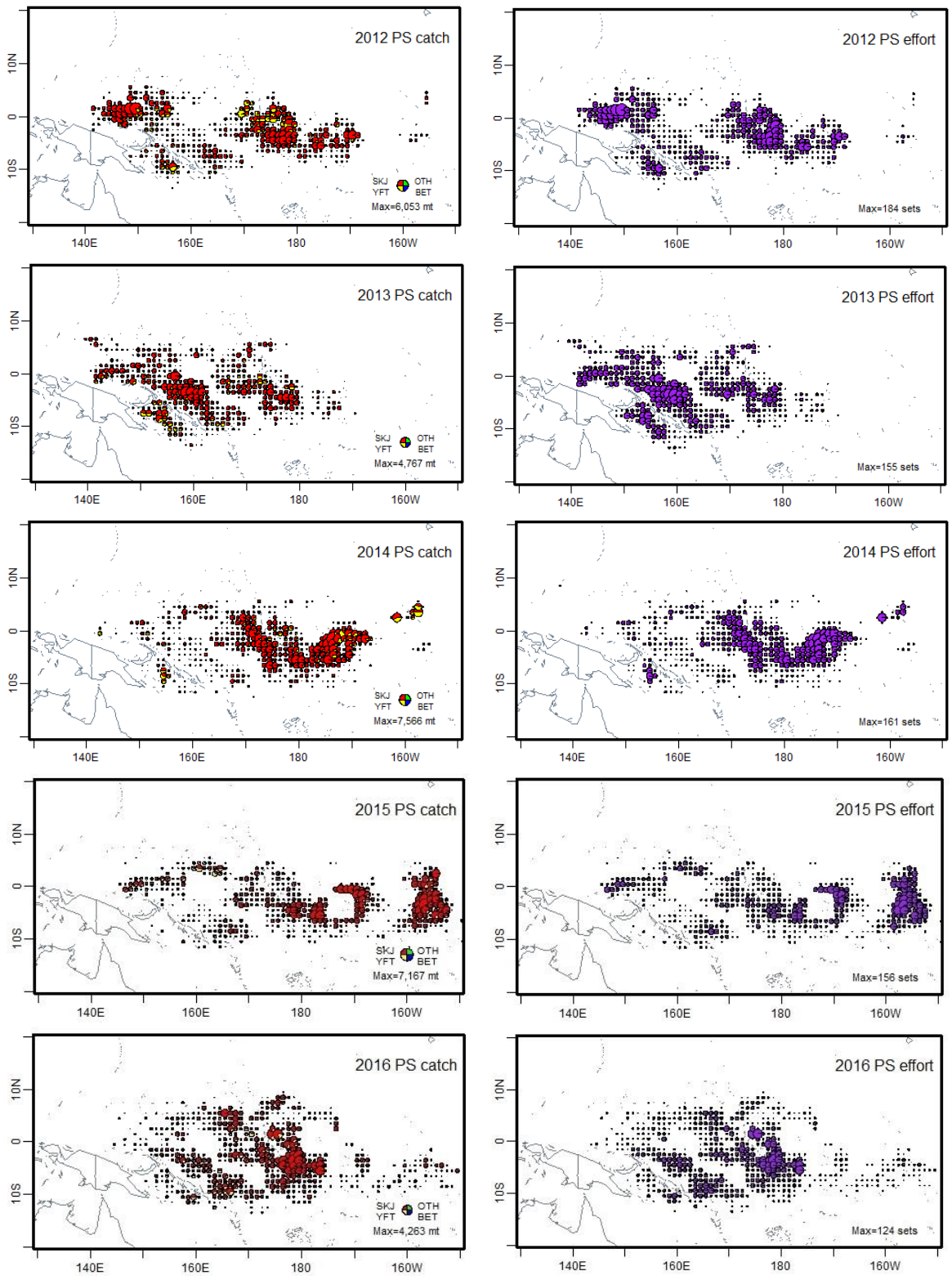

Fig. 4. Distribution on catch (left) and effort (right) of target species by the Korean tuna purse seine fishery operating in the WCPFC Convention Area, 2012-2016.

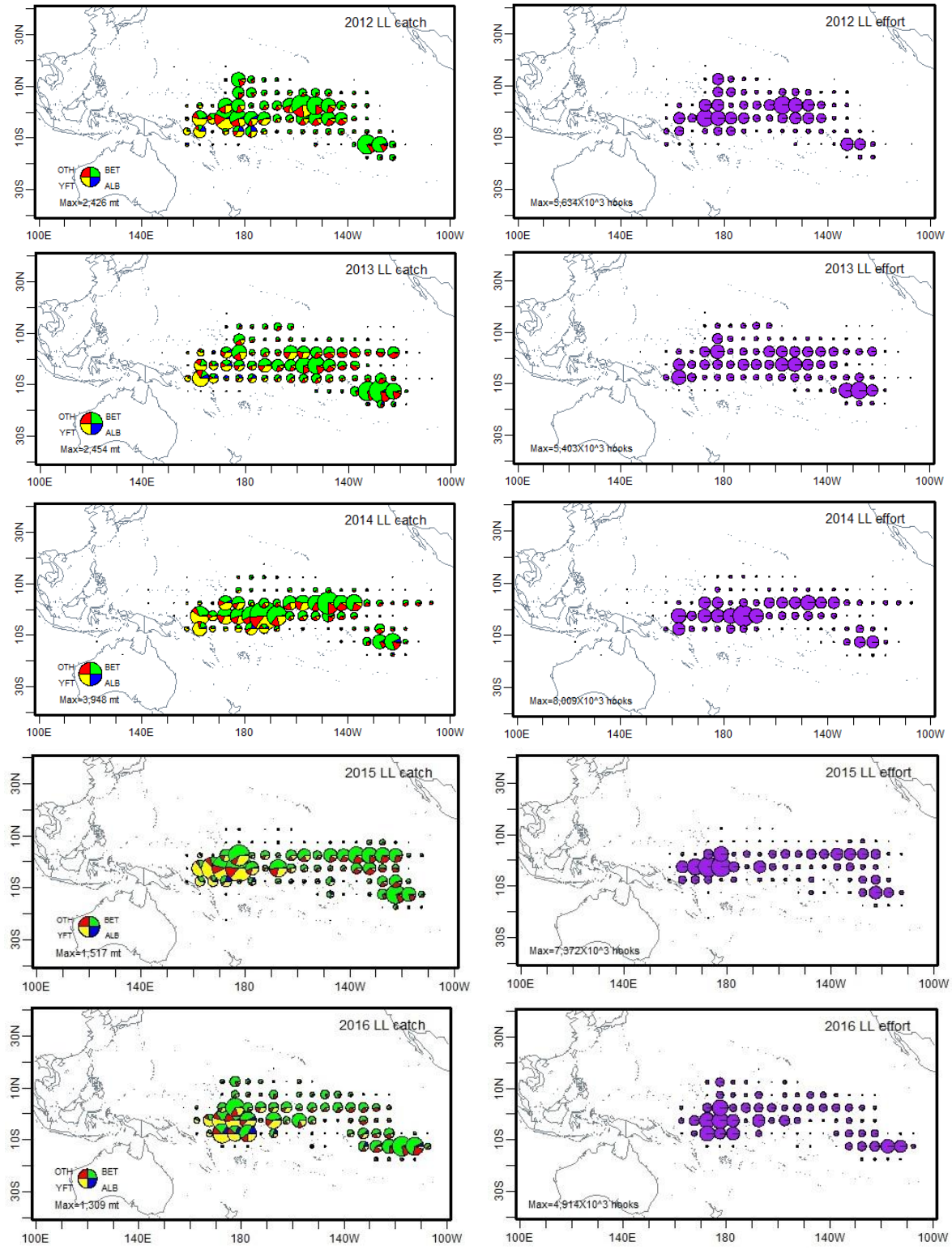

Fig. 5. Distribution on catch (left) and effort (right) of target species by the Korean tuna longline fishery operating in the Pacific Ocean, 2012-2016.

Table 4. Annual catch of Pacific bluefin tuna by fishery operating in the Korean waters, 2002 - 2016

Year	Catch (ton)				
	PS(no. of vessels)	Set Net	Troll	Trawl	SUM
2002	932(32)	0	0	1	933
2003	2,601(29)	0	0	0	2,601
2004	773(29)	0	0	0	773
2005	1,318(29)	0	0	9	1,327
2006	1,012(29)	0	0	3	1,015
2007	1,281(29)	0	0	4	1,285
2008	1,866(29)	0	0	10	1,876
2009	936(27)	0	0	4	940
2010	1,196(25)	0	0	16	1,212
2011	670(25)	0	0	14	685
2012	1,421(24)	0	1	2	1,424
2013	604(24)	1	0	0	605
2014	1,305(24)	6	0	0	1,311
2015	676(24)	1	0	0	677
2016*	1,024(24)	3	0	2	1,029

* : Data for 2016 is provisional

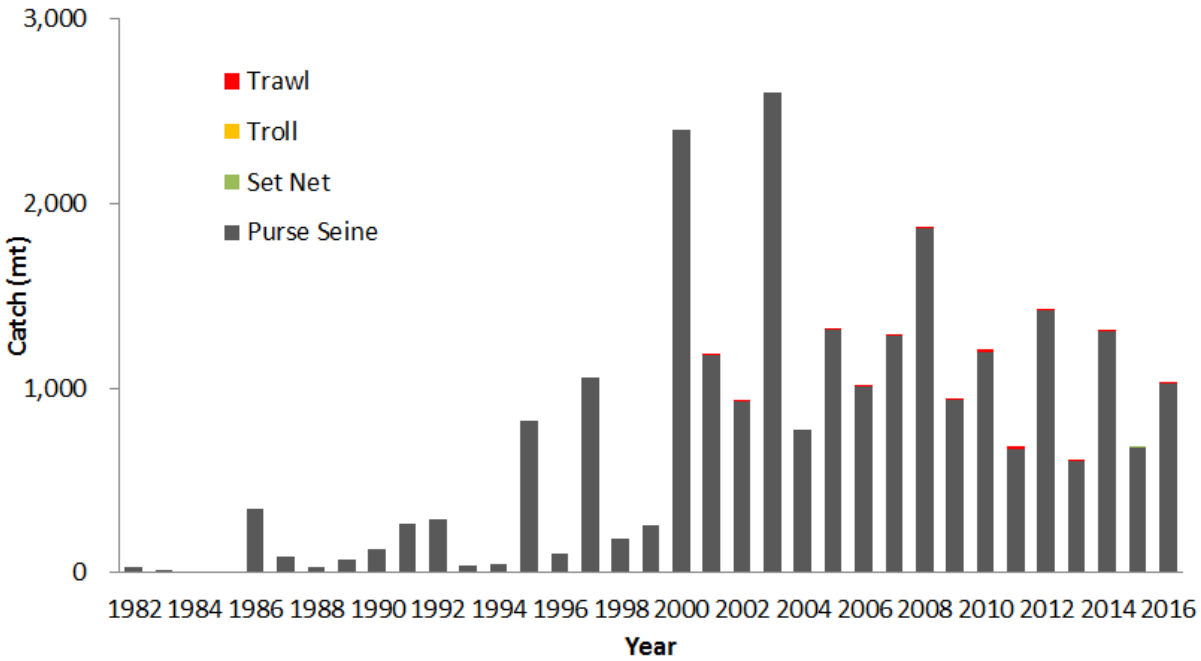

Fig .6. Historical catch of Pacific bluefin tuna by fishery operating in the Korean waters, 1982-

2016.

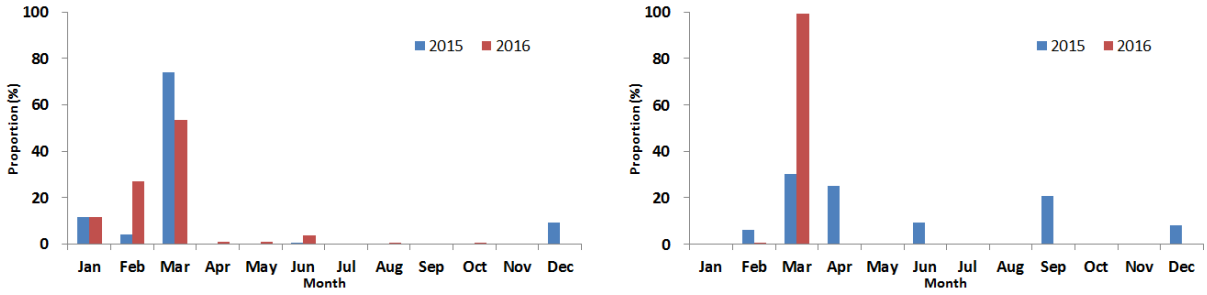

Fig. 7. Monthly catch proportion by size (left : small (< 30kg), right : large (30kg or larger than 30kg) of Pacific bluefin tuna in 2015 and 2016.

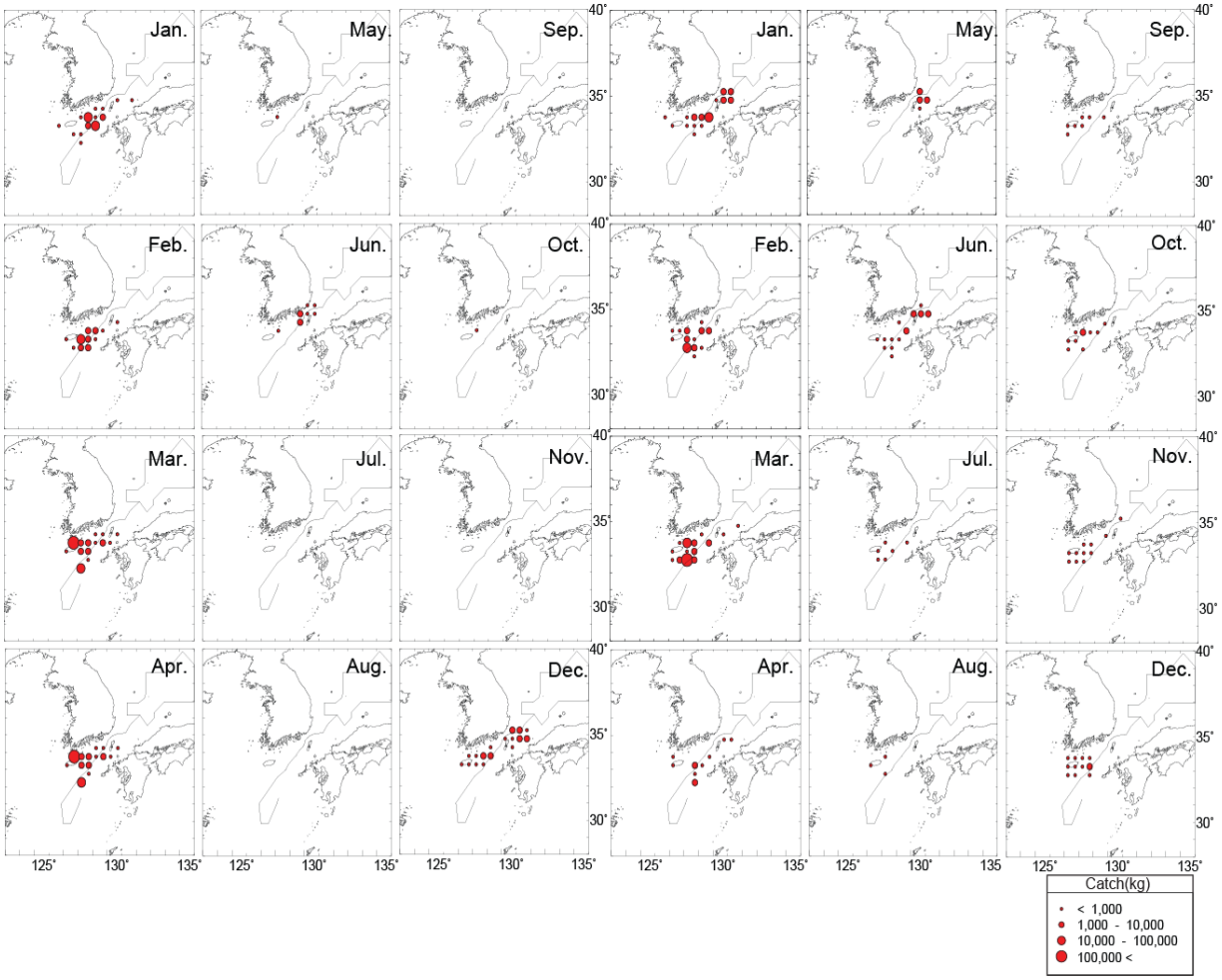

Fig. 8. Monthly distribution on catch of Pacific bluefin tuna caught by Korean offshore large purse fishery in 2015 and 2016.

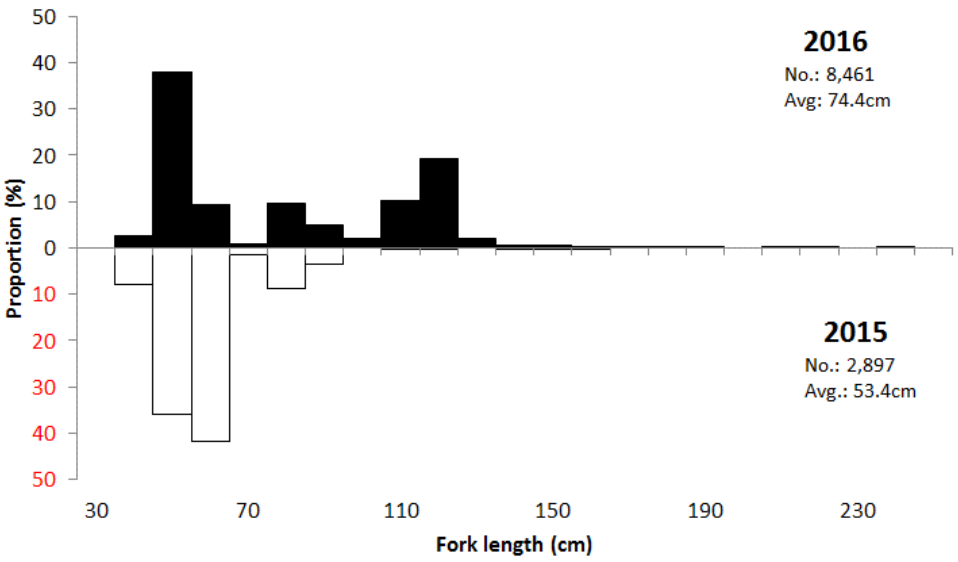

Fig. 9. Proportion on length distribution of Pacific bluefin tuna in 2015 (below) and 2016 (upper).

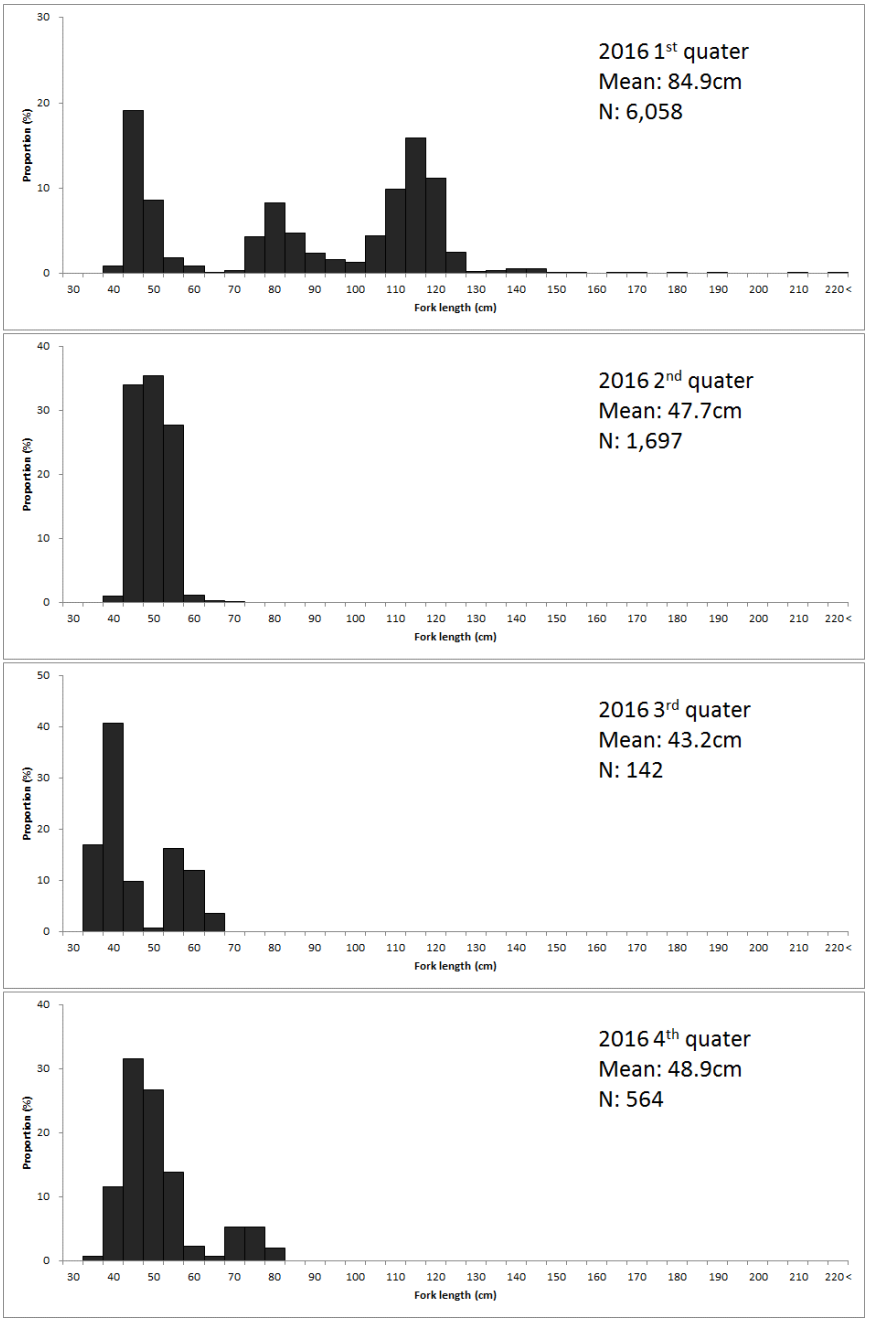

Fig. 10. Quarterly proportion on length distribution of Pacific bluefin tuna caught by the Korean offshore larger purse seine in 2016.