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National Report of Korea¹

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Abstract

Korean fisheries fishing for tunas and tuna-likely species in the North Pacific are distant water tuna longlines (DWLL) and distant water tuna purse seines (DWPS). Offshore large purse seiners and troll are also involved in the catch of Pacific bluefin tuna in the EEZ. As Korea is a member of both WCPFC and IATTC, DWLL and DWPS have been fishing in the areas of those RFMO's competence, in the recent years exclusively south of 20°N. DWLL and DWPS are managed by the Distant Water Fisheries Development Act and fisheries related to the mortality of pacific bluefin tuna in the EEZ by the Ministerial Directive put in place in 26 May 2011.

Total catches of Korean distant water tuna and tuna like species in the North Pacific was 104,175 t in 2012. Longline catch was 16,730 t in 2012, which was 84.4 % of the record in 2004. Purse seine catch was 87,445 t in 2012. This was also 86.8% of the peak in 2003. In longline catch, bigeye, yellowfin, swordfish accounted for 67.9%, 13.8%, 5.1%, 3.5% of total, respectively. In purse seine catch, skipjack, yellowfin and bigeye tuna were 77.2% an 22.4 % and 0.5% in 2012, respectively. Longline fishing efforts decreased from 42,485 thousand hooks in 2003 to 33,689 thousand hooks in 2012 but showing slight increasing trend during the past 5 years. Purse seine fishing efforts decreased from 2,876 sets in 2003 to 2,408 sets in 2012. Longline fishing efforts were higher in the central area and the eastern area, while purse seine efforts were concentrated on the western areas in 2012.

Pacific bluefin tuna catch by offshore large purse seiners 1,421 t in 2012, the highest in the last 5 years. The catch occurred throughout year with the highest in May and July but less than 10 t from August to November. They were all juvenile mostly with a mode of 42-54 cm. The catches occurred in the South Sea centering around Jeju Island throughout the year.

The WCPFC/NC8 requested Korea to explain the operational characteristics of Korean offshore large purse seiners fishing for Pacific bluefin tuna. For this purpose, the National Fisheries Research and Development Institute (NFRDI) is conducting the onboard research with an international scientific observer from March to July 2013. The results will be presented at NC9.

Introduction

The 55 year-old Korean distant water tuna longline fishery that stepped up the first fishing in the Indian Ocean in 1957, has explored the Pacific Ocean since 1958 and the Atlantic Ocean since 1967. The high-seas and within the coastal states in the South Pacific have been the main fishing grounds for Korean longline fishery and tuna purse sein fishery as well. In early years, longliners based at foreign ports near the fishing grounds but became to use home ports as they have been equipped with deep freezing facilities since 1972. All longline vessels have based on home ports in since 1999. This change gave advantages in exporting the products to Japanese markets and some others. In domestic markets, tuna SASHIMI demands have been increasing year by year.

Korean tuna purse seine fishery was initiated by accessing into the Eastern Pacific fishing ground with 3 vessels in 1971. Helicopter-aided mass operations were introduced in 1979 for the first time and the number of vessels increased to 28 as of the end of 2012. Most of the catches are supplied to the packers for our domestic consumption, and the remainders are being exported to foreign canneries.

Korean distant water fisheries are managed by the Distant Water fisheries Development Act put into effect on the 4 February, 2008. Currently, over 90% of Korean catch of tuna and tuna-like species have been harvested in the Pacific ocean, of which about 10% of purse seine catches and 44% of longline catches were attributed to the north Pacific south of 20°N for the past 5 years.

Pacific bluefin tuna has been caught throughout the year by domestic fleet, mostly by the offshore large purse seiners targeting pelagic species such as mackerels within the EEZ. The data and information had been rarely available until 2009 when the WCPFC adopted the CMM 2009-07 that was replaced by the CMM 2010-04 and again by the CMM 2012-06. Accordingly, Korea established the Ministerial Directive effective in 26 May 2011, in accordance with which research and management have been continuing in Korean EEZ. Since 2010, the National Fisheries Research and Development Institute (NFRDI) has been undertaking a 'Five-year Scientific Research Plan on PBF', which is scheduled to be concluded until 2014. Under the plan, the NFRDI is collecting and analyzing the biological data (e.g. length, weight, other biological aspects); and updating and correcting historical and current data.

This report provides the information on the Korean distant-water tuna fisheries in the North Pacific Ocean and Pacific bluefin tuna catch in Korean EEZ by domestic fleet.

Data collection and handling

Distant water tuna purse-seining and longlining are Korean fisheries to fish for tuna and tuna-like species in the Pacific Ocean. Fishing companies report the catches of their vessels to the Korea Overseas Fisheries Association (KOSFA). The fishing vessels submit monthly the logbook that contains catch and effort and the length measurement to the NFRDI. NFRDI

is cross-checking the data of both total catch compiled by KOSFA and the catch and effort data.

Korean Distant water tuna purse seine and longline fisheries statistics for North Pacific Ocean are derived from the whole Pacific Ocean based on the logbook and the catch statistics for distant water fisheries.

Before 26 May 2011, the catch data of Pacific bluefin tuna for 1982-1999 were Japanese import records, for 2000-2004 were the Korean export data to Japanese markets obtained from Korean offshore large purse seine fisheries cooperatives, and for 2005 to 2012, the monthly sale slips of Busan Cooperative Fish Market compiled by the NFRDI. In addition, the data for 2005-2012 were revised on the basis of Yoo et al. (2011) and the data for 2000-2004 were done based on Yoo et al. (2012).

Information on distant water fisheries

1. Fleet structure

The North Pacific Ocean is an integral part of the Pacific Ocean fishing ground of Korean distant water tuna purse seine and longline fisheries in both the WCPFC and the IATTC areas of competence south of 20°N. All the vessels registered to both RFMOs are engaging in fishing for tuna and tuna-like species in the North Pacific Ocean. The number of vessels by gear active in the Pacific Ocean is presented in Fig. 1 and table 1. The number of purse seine vessels, once peaked at 39 in 1990, has been reduced to the present level of 28 in 2012. 12 vessels were of 500-1000 class, 11 vessels of 1000-1500 class and 5 vessels of over 1500 class. The number of longline vessels, once culminated at 220 in 1991, has also been reduced to 108 in 2008 but slightly increasing to 124 in 2011 and 126 in 2012. All longline vessels were in the class of 201-500 GRT with deep freezing facilities.

2. Annual catch and effort

Annual catch and effort by gear and primary species in the North Pacific are tabulated in Table 2, 3 and Fig. 2 and 3. Total catches declined from 118,039 t in 2003 to 39,579 t in 2011, but total catch increased as 104,175 t in 2012. The catch portion of the North Pacific to the entire Pacific was 45.5% in longline fishery and 15.4% in purse seine fishery. The catches occurred in the areas south of 20°N. Longline catch was 16,730 t in 2012, which was 84.4 % decrease from the peak in 2004. Purse seine catch was 87,445 t in 2012. This was 86.8% decline from the peak in 2003. In longline catch, bigeye, yellowfin, swordfish, blue marlin, albacore, striped marlin and black marlin were 67.9%, 13.8%, 5.1%, 3.5%, 0.9%, 0.3% and 0.2% in 2012, respectively. Bigeye slightly increased, yellowfin slightly declined and swordfish and black marlin slightly increased, compared to the catch of past 10 years. In purse seine catch, skipjack, yellowfin and bigeye tuna were 77.2%, 22.4 % and 0.5% in 2012, respectively. Skipjack catch in 2012 was 76.1% of the peak in 2003 and yellowfin tuna was

68.4% of the peak in 1993. Longline fishing efforts decreased from 42,485 thousand hooks in 2003 to 33,689 thousand hooks in 2012 but showing slight increasing trend during the past 5 years. Purse seine fishing efforts decreased from 2,876 sets in 2003 to 2,408 sets in 2012.

3. Fishing pattern

Catch and effort by gear are mapped in Fig. 4 and 5. Korean tuna longline fishing efforts were higher in the central area and the eastern area, while purse seine fishing efforts were concentrated on the western areas in 2012. Purse seining has generally been operating in the tropical area of the western and central Pacific between 140°E-180°E and, when oceanographic conditions were favorable, it extended farther to the east. It was remarkable that it most inclined to the west in 2011, but moved to the central part in 2012. While longline efforts were deployed relatively higher in both the central and the eastern areas. These fishing patterns showed similar pattern with different year except for 2011.

Information on Pacific bluefin tuna catch by coastal fisheries in Korean EEZ

1. Offshore large purse seine fishery

The annual and monthly catches of bluefin tuna are presented in Table 4 and Fig. 6 and 7. The catch of Pacific bluefin tuna by offshore large purse seiners increased from 1,196 t in 2010 to 1,421 t in 2012. This was 119.4% of the average catch of the last 5 years. The number of offshore large purse seiners was 24 in 2012 and continuously decreasing from 48 in 1994 by virtue of the fishing capacity control by the government. The catch occurred throughout year with the highest from May and July but less than 10 t from August to November in 2012. And peak period of monthly catch were different annually.

Quarterly distributions of fork length of PBF were presented in Fig. 8. They were almost juvenile (<150 cm). While, in quarter 1, 3 and 4, there was one mode with the range of 35-60 cm, quarter 2 has a different shape with the range of 35-90 cm and 2 modes.

The catch distribution is shown in Fig. 9. The catches were distributed in the South Sea centering round Jeju Island throughout the year and their centering occurred in the southeastern sea in winter in 2011 and 2012.

2. Coastal troll fishery

In accordance with the Ministerial Directive put into effect in 26 May 2011, anyone who wish to catch bluefin tuna for fattening farming were obliged to get the approval by the regional government. 34 coastal trollers (3.6-7.3 G/T) targeting Spanish mackerels and yellowtails were approved for fishing Pacific bluefin tuna around Jeju Island in 2012. The catches were presented in Table 4 and 5, indicating that a total of 1,091 kg (1,679 individuals ranged 0.5-0.8 kg) were in 2012, which were all transferred to the fattening farms.

Data collection system

Tuna catch statistics of Korea distant water tuna fisheries (DWLL and DWPS) are obtained from two ways of data reports. Fishing companies report the catch of their fishing vessels to Korea Distant water Fisheries Association (KOSFA) every month. Fishing vessels monthly submit in electronic format to NFRDI the logsheet that contains the fishing operational information, including catch and effort and the length data. All data collection and reporting requirements adopted by tuna RFMOs were reflected in the Revised Distant-water Fisheries Act put into effect in 5 December 2012 and, accordingly, the NFRDI improved fisheries data collection capable of data cross-checking to provide the data in accurate and timely manner.

In accordance with the Ministerial Directive for conservation and management of Pacific bluefin tuna in the Korean EEZ, effective in 26 May 2011, anyone who wishes to catch for PBF in Korean EEZ should obtain the approval from the regional government, and catch statistics should be provided to the NFRDI. The NFRDI is developing the data collection protocol and system.

Research activities

On request of WCPFC/NC8, the NFRDI is conducting the research on operational characteristics of Korean offshore large purse seiners fishing for Pacific bluefin tuna, with an international scientific observer onboard a vessel (129 G/T) for March-July, 2013. The observer is collecting the relevant fishing information such as setting and hauling time, catch by species, feasibility of species identification from sonar monitor, etc. And the results from those surveys will be presented at NC9.

To investigate the migration pattern of pacific bluefin tuna in Korean waters, the NFRDI is carrying out the tagging. On June 6, 2013, a pop-up archival tag (MK-10) was attached to a Pacific bluefin tuna and released, which is 78cm in fork length.

The NFRDI is carrying out the data collection and biological sampling in the landing port of Busan and the verification of PBF catch data (number of box used in auction, actual weight of catch/box by size, detailed catch data from daily sale slips, etc.) in order to obtain the better PBF catch data by offshore large purse seiners since 2010.

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 Korean vessels by gear and size, actually operating in the Pacific Ocean, 2007-2012

Year	GRT class by gear									
	Longline					Purse seine				
	Total	0-50	51-200	201-500	500+	Total	0-500	501-1,000	1001-1,500	1,500+
2007	122	-	-	122	-	28	-	14	13	1
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

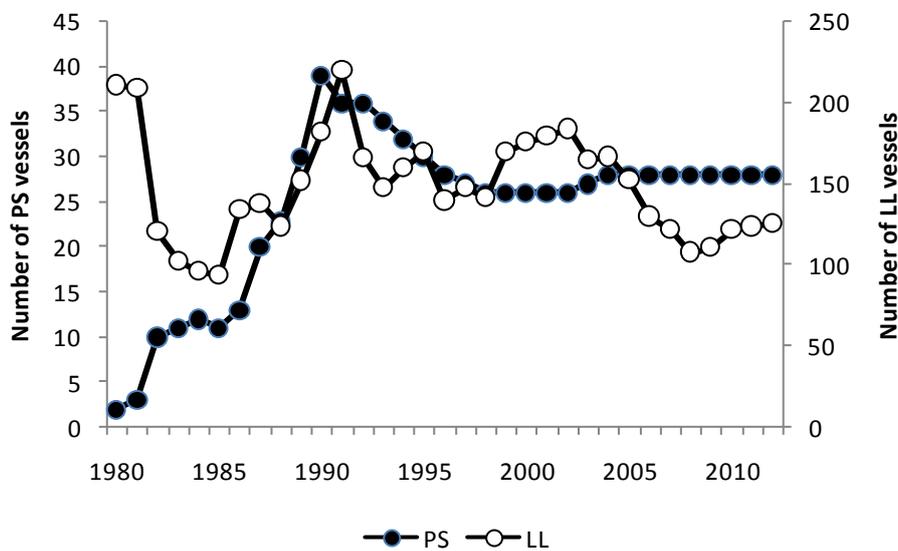


Fig. 1. The annual number of fishing vessels of the Korean tuna distant-water fishery in the Pacific Ocean, 1980-2012.

Table 2. Number of hooks (1,000 hooks) and catch (tons) of tuna and tuna-like species by the Korean distant-water longline fishery in the North Pacific during 2002-2012. Data for 2012 is provisional

Year	No. of hooks (1,000)	ALB	YFT	BET	SKJ	BUM	MLS	SWO	BLM	SFA	SHK	OTH	Total
2002	33,507	112	3,137	10,786	0	152	188	439	479	123	185	1,400	17,001
2003	42,485	146	4,741	9,739	6	159	206	381	819	129	95	931	17,352
2004	38,240	78	5,144	12,453	101	227	75	410	919	1	8	404	19,819
2005	28,687	420	2,958	9,257	35	304	136	404	997	0	10	820	15,340
2006	37,741	135	5,096	11,494	0	217	56	465	1,063	0	0	941	19,468
2007	27,136	137	2,175	9,606	0	121	47	453	887	0	1	291	13,718
2008	32,292	405	2,678	10,867	0	215	29	775	709	0	4	691	16,373
2009	27,306	101	2,987	10,723	0	223	22	967	642	0	13	895	16,575
2010	28,155	109	1,990	9,422	0	254	18	676	574	0	70	526	13,639
2011	33,226	84	3,199	9,103	0	684	48	971	158	1	548	980	15,776
2012	33,689	157	2,306	11,357	8	590	33	846	57	1	501	875	16,730

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

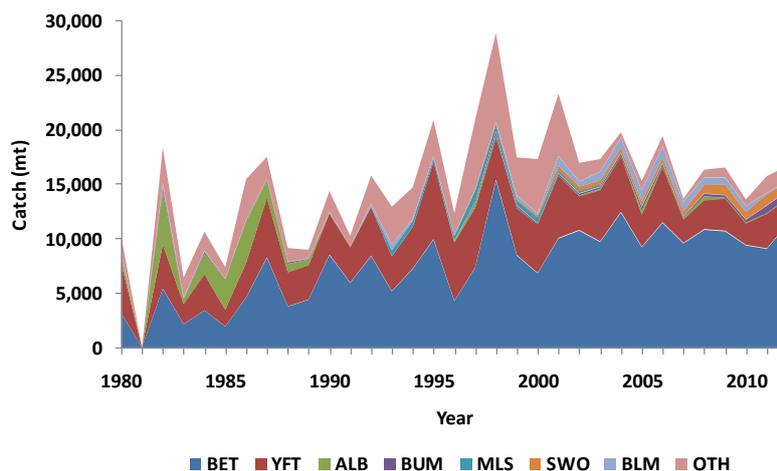


Fig. 2. Annual catch of Korean distant-water longline fishery by primary species in the North Pacific for 1980-2012.

Table 3. Fishing effort (sets) and catch (tons) of tunas by the Korean distant-water purse seine fishery in the North Pacific during 2002-2012. Data for 2012 is provisional

Year	No. of sets	SKJ	BET	YFT	OTH	Total
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	9,269	4	7,842	0	17,114
2009	1,245	38,467	15	7,190	0	45,672
2010	727	20,970	358	4,039	0	25,368
2011	770	18,331	216	5,256	0	23,803
2012	2,408	67,489	406	19,549	1	87,445

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

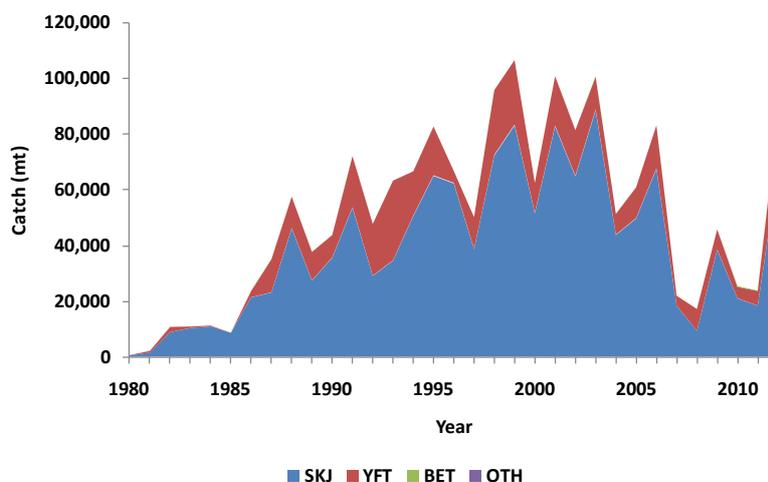


Fig. 3. Annual catch of Korean distant-water purse seine fishery by primary species in the North Pacific during 1980-2012.

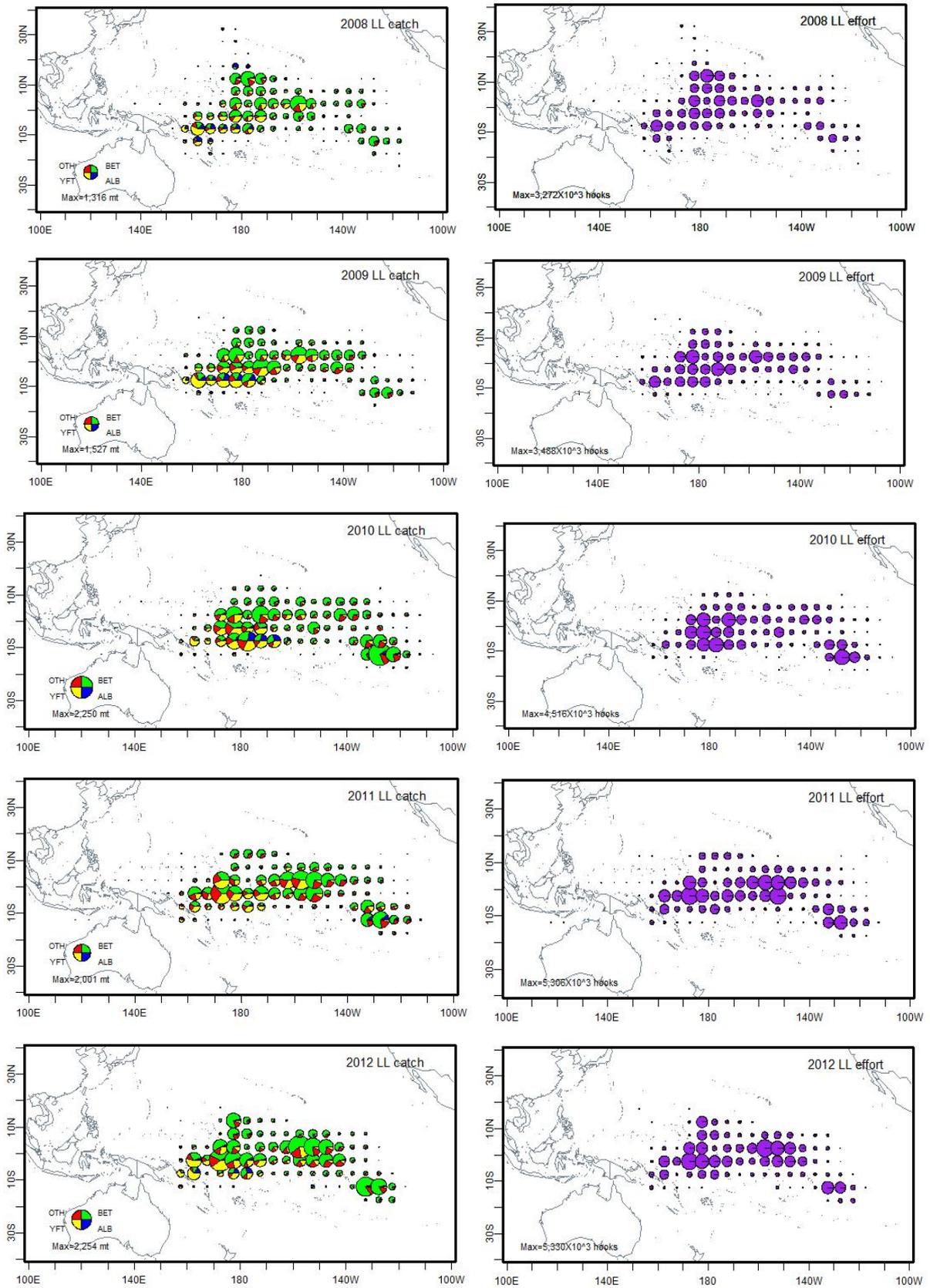


Fig. 4. Annual catch and effort distributions of target species by Korean distant-water longline fishery operating in the Pacific Ocean, 2008-2012.

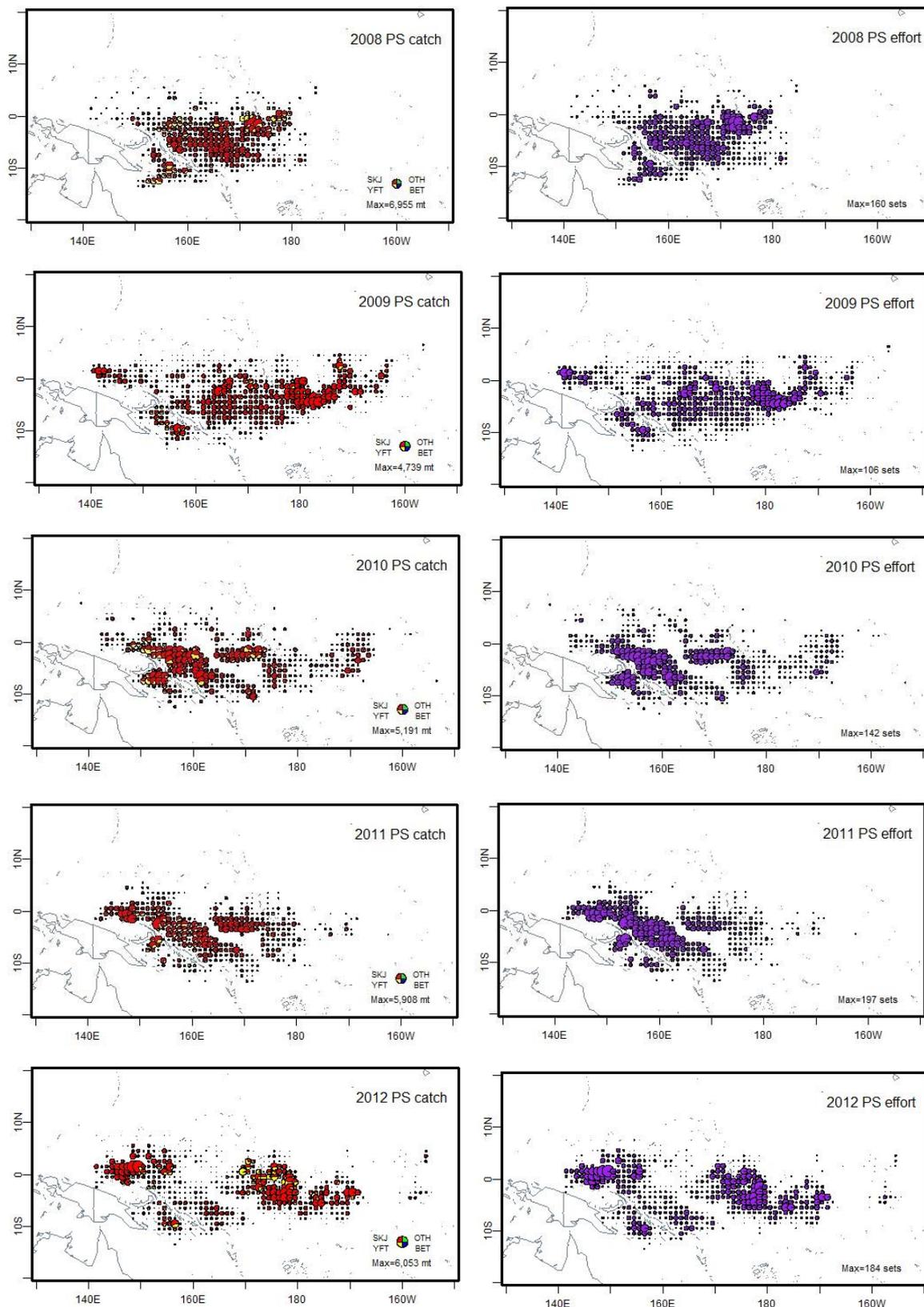


Fig. 5. Annual catch and effort distributions of target species by Korean distant-water purse seine fleets operating in the Pacific Ocean, 2008-2012.

Table 4. Annual catch of Pacific bluefin tuna by offshore large purse seiners and coastal trollers in Korean waters (unit : mt)

Year	PBF catch by OLPS ^{*1} (mt)	Number of OLPS vessels	PBF catch by coastal trollers (mt)	Permitted number of coastal trollers
1982	31	48		
1983	13	48		
1984	4	48		
1985	1	48		
1986	344	48		
1987	89	48		
1988	32	48		
1989	71	48		
1990	132	48		
1991	265	48		
1992	288	48		
1993	40	48		
1994	50	48		
1995	821	36		
1996	102	36		
1997	1,054	36		
1998	188	36		
1999	256	36		
2000	2,401	32		
2001	1176	32		
2002	932	32		
2003	2,601	29		
2004	773	29		
2005	1,318	29		
2006	1012	29		
2007	1,281	29		
2008	1,866	29		
2009	936	27		
2010	1,196	25		
2011	670	25	0.1	14
^{*2} 2012	1,421	24	1	34

*1 : OLPS is Offshore Large Purse Seiner

*2 : Data for 2012 is provisional

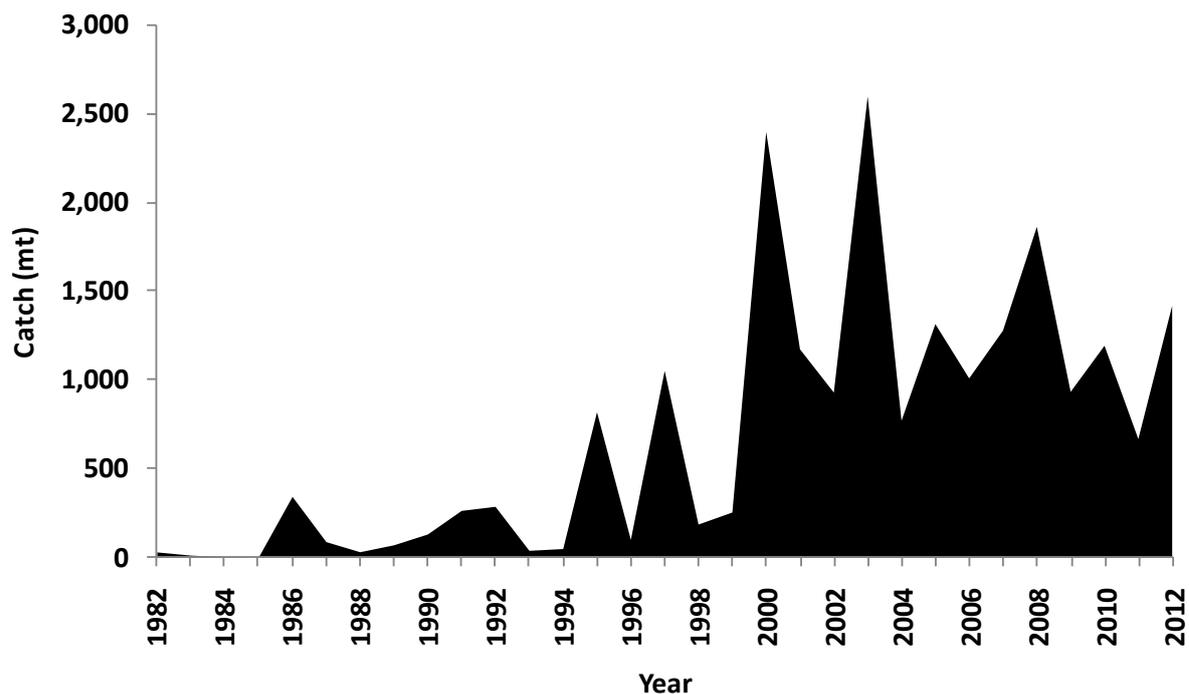


Fig. 6. Annual catch of Pacific bluefin tuna caught by offshore large purse seiners from 1982 to 2012.

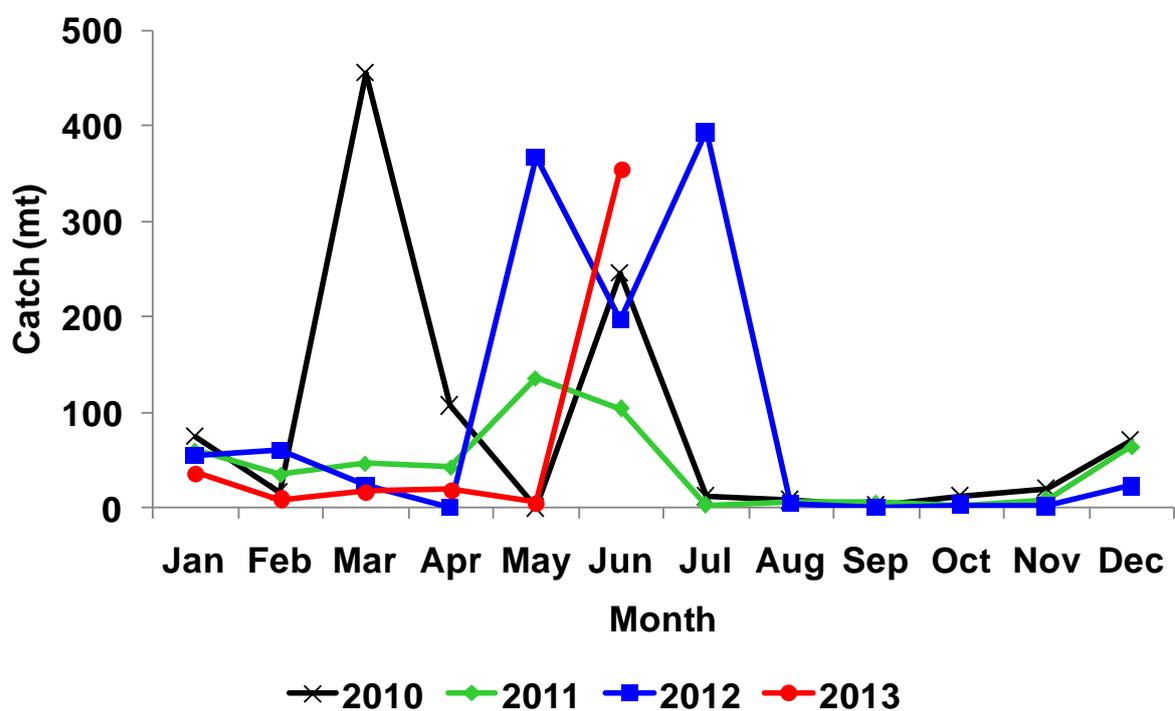


Fig. 7. Monthly catches of Pacific bluefin tuna caught by offshore large purse seiners from 2010 to 2013.

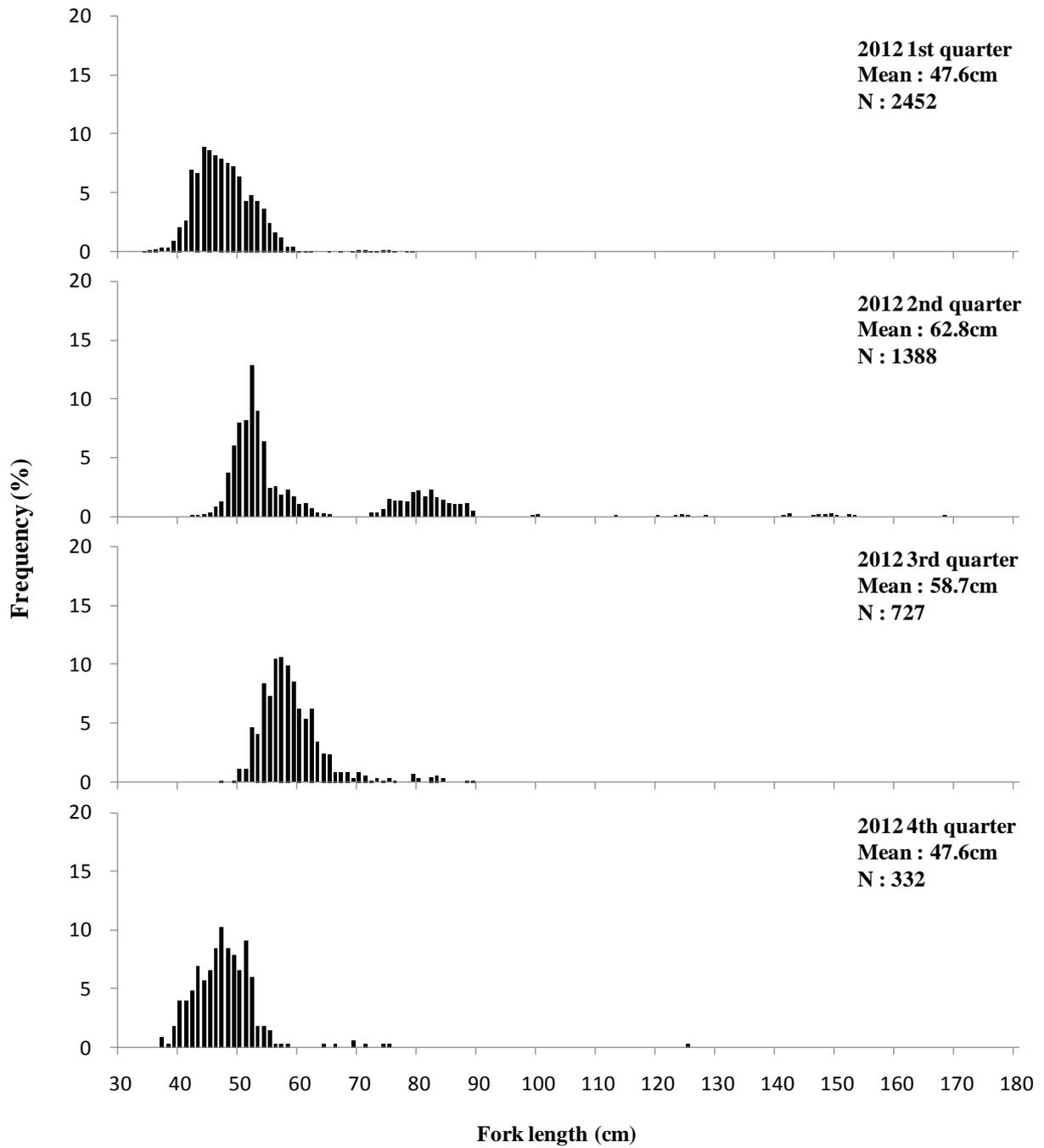


Fig. 8. Quarterly length frequency of Pacific bluefin tuna caught by offshore larger purse seiners in 2012.

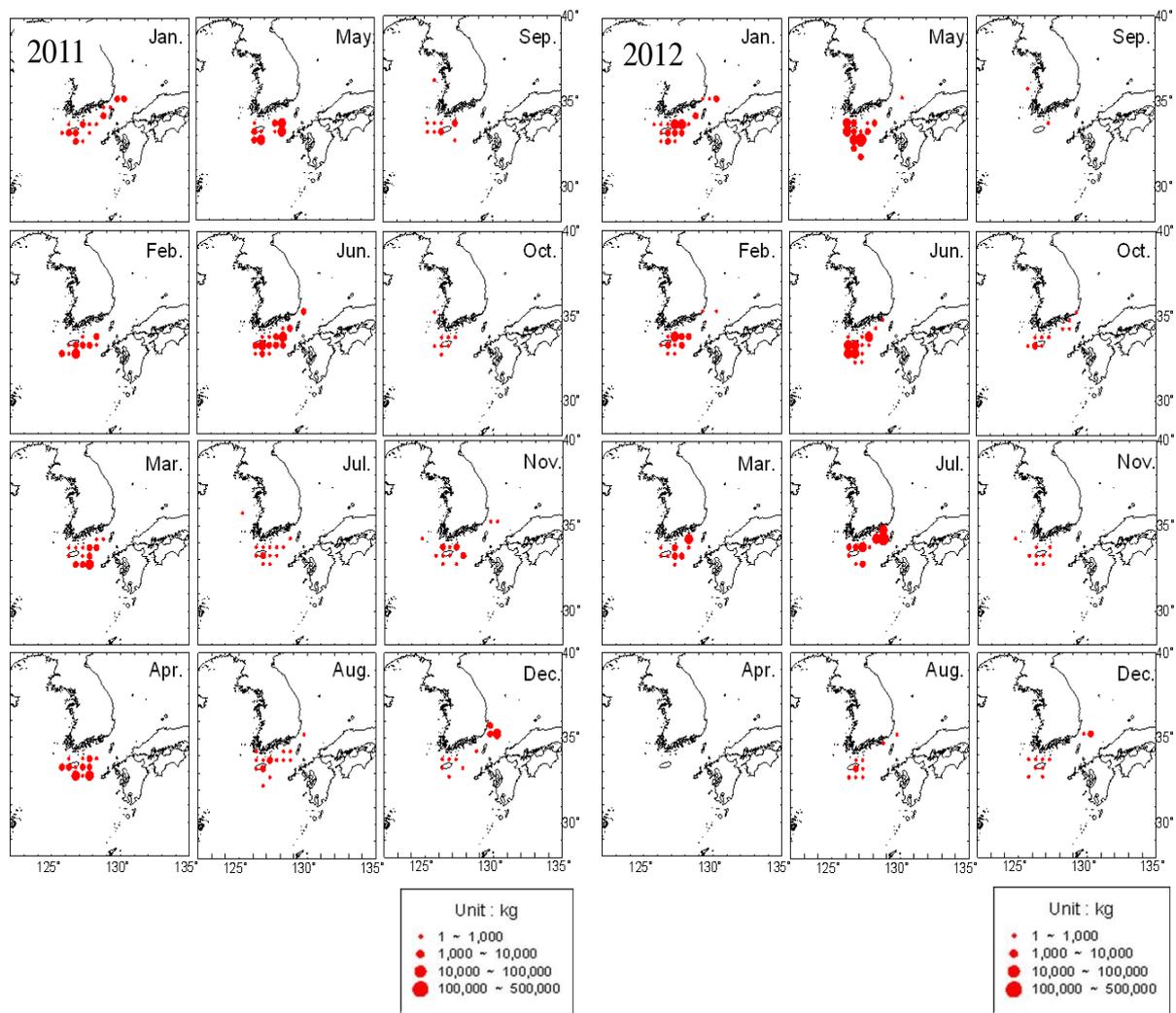


Fig. 9. Monthly distributions of Pacific bluefin tuna caught by offshore large purse seiners in Korean waters from 2011 to 2012.

Table 5. Catch of Pacific bluefin tuna by coastal trollers in adjacent water of Chuja Island (Northwestern South Sea) in 2012

Year	Month	Day	Catch (inds.)	Average weight (TW, g)
2012	9	1	22	500-800
		2	115	
		3	38	
		4	265	
		5	364	
		6	327	
		7	103	
		8	163	
		9	75	
		10	48	
		11	114	
		12	45	
Total		1,679		