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PART 1: INFORMATION ON FISHERIES, RESEARCH, AND STATISTICS

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Republic of Korea

Part 1. INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

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Scientific data was provided to the Commission in accordance with the decision relating to the provision of scientific data to the Commission on the 30th April 2010	**YES**

There are two types of Korean tuna fisheries operating in WCPFC Convention Area: distant-water purse seine fishery and longline fishery. In 2009, total catches by 28 purse seine vessels and 111 longline vessels were 283,278 MT and 31,458 MT, respectively. In 2009, 3 observers were deployed to collect fishing and biological data of tuna fisheries in the WCPFC Convention area.

1 ANNUAL FISHERIES INFORMATION

Korean tuna fisheries dates back to the mid-1950s when Korean distant-water fishery began with small experimental longline fishing for tunas in the Indian Ocean. Since then the Korean tuna fishing fleet has expanded to the three major oceans before the 1970s. Currently, over 90% of Korean catch of tuna and tuna-like species has occurred in the western and central Pacific ocean (WCPO) area. In 2009, 28 purse seine vessels and 111 longline vessels were operated in WCPFC Convention Area. Total catch were 283,278 MT by purse seiner and 31,458 MT by longliners, respectively. 3 observers were deployed to collect fishing and biological data of tuna fisheries in the WCPFC Convention area in 2009.

1.1 Fleet structure

There are two types of Korean fishing vessels; longline and purse seine; operating for tuna fishing in the WCPFC Convention area. The number of these vessels is as in Table 1. The number of purse seine vessels was 28 during 2005-2009. The number, once peaked at 39 vessels in 1990, had been reduced to 26 -28 since 1998 and then has been maintained at 28 up to date. The number of longline vessels was 220 in 1991 and then reduced from 122 in 2007 and 126 in 2008 to 113 in 2009. The size of vessels was between 408 and 498 GRT for longliners, and 701 to 2,023 GRT for purse seiners. Purseseine vessels lager than 2000 GRT were launched since 2006.

1.2 Annual catch in the WCPFC Convention Area

Korean catch of tuna and tuna-like species has mainly occurred in the Pacific, over 94% of which are in the WCPO. The annual catch by fishery in the Pacific and the WCPFC Convention area in the recent 5 years is as in Table 2 and Figure 1. The total catch ranged from 248,224 to 314,736 mt, with 280,937 mt on the average of 5 years, of which 89.2 % was caught by purse seiners and 10.8% by longliners. The purse seine catch was shown as an increasing trend whereas the longline catch was decreasing. Dominant species caught by Korean fisheries were skipjack, yellowfin and bigeye tuna, the proportion of which was 73.7%, 18.9% and 5.0%, respectively. Though small in the catch, yellowfin and bigeye tuna are worthy of higher commercial value as they are sold as the high end in the sashimi market.

1.2.1 Purse seine fishery

Purse seine fisheries have been mainly operating in the WCPO throughout the year. The number once peaked at 39 vessels in 1990 had been reduced to 26 -28 since 1998 and has been maintained at 28 up to date. The total purse seine catch during the last five years ranged from 204,500 mt to 283,300 mt, with 249,585 mt on average. Skipjack and yellowfin tuna were the main species caught with the proportion of 82.6% and 17.2% of the total catch, respectively (Table 3).

1.2.2 Longline fishery

Korean longline fisheries have been mainly targeting bigeye and yellowfin tuna and secondarily albacore. The total annual catch in the WCPFC area ranged from 22,900 mt to 38,400 mt in the recent 5 years (Table 4). Of the total catch, bigeye tuna, yellowfin

tuna and albacore were 46.5%, 32.2% and 6.3%, respectively and billfishes (swordfish, blue marlin, striped marlin, black marlin and sailfish) were 12.6%. In billfishes, blue marlin was the most dominant species with 44.5% of the total. Fluctuation of bigeye tuna catch contributed the most to the change in the total longline catch. In 2005 it was 15,600 mt and was largely reduced to 10,000 mt in 2007 but in 2008 and 2009, it increased to the previous level. This fluctuation was known to have been resulted from the shift of fishing grounds from the east to the west, in view of the change in catch and species composition.

1.3 Fishing grounds

Korean tuna purse seine fisheries have generally been operating in the tropical area of the Western and Central Pacific between 140^{o}E-180^{o} and rarely extend to the east over 160^{o}W, due to oceanographic conditions such as El-Ninos (Fig. 2). On the other hand, longline fisheries have fished throughout the tropical area of the whole Pacific between 20^{o}N and 20^{o}S (Fig. 3). In recent years, they are operating mainly at the western Pacific rather than the eastern Pacific. .

1.4 Estimated total catches of non-target, associated and dependent

In accordance with a series of conservation measures (CMM 2007-04, 2008-06 and 2008-03) adopted by WCPFC regarding the collection of non-target, associated and dependent species, additional columns were introduced in the logbook for seabirds, sharks, turtles and marine mammals in 2009. Korean longline vessels reported 20 mt of shark species but it was without species classification in 2009. The reason was that it was the first year for Korean fishers to report the catch of non-target, associated and dependent species and they was not yet accustomed to identify the species in detail. The scientific observers have been collecting catch data of non-target, associated and dependent species since 2002. In 2009, 3 Korean scientific observers reported 2 shark species and 1 turtle species from purse seiners and 5 shark species from longliners as described in Table 5,

2 RESEARCH AND STATISTICS

2.1 Summary of observer programs

The Ministry for Food, Agriculture, Forestry & Fisheries of Korea initiated an observer program for distant-water fisheries including tuna fisheries in 2002. The purpose is to meet the requirements of regional fisheries management organizations (RFMOs) including the WCPFC and therefore the mission of trained observers is similar to those set out in the Conventions of the RFMOs. Before the observer program was launched, Korea used to dispatch NFRDI scientists, when necessary, to commercial tuna vessels to monitor their fishing activities and collect catch statistics including biological samples, which were unobtainable by regular data collection systems. During the past 10 years, a total of 16 scientific observations were made for tuna fisheries operating in the WCPO. In 2009, three observers were deployed to monitor tuna fisheries in the WCPFC Convention area.

Two trained observers monitored two Korean tuna purse seine vessels from June to July in 2009. During the 93 days of the observation period, a total of 65 purse seine sets was monitored in the waters between 1°S-8°S and 170°E-167°W (Table 6 and 7). Fork length of the samples of skipjack, yellowfin tuna and bigeye tuna was measured onboard (Fig. 4 and 5).

One trained observer was deployed to one Korean longline vessel (416 GRT) fishing in the Pacific Ocean between 12° N–5° S and 171°E-171°W. During the 70 days of the observation period from April to July 2009, a total of 41 longline sets was monitored (Table 8 and 9). Fork length of the samples of bigeye tuna, yellowfin tuna, albacore and blue marlin was measured (Fig. 6).

2.2 Research Activities

Three observers placed tags on 19 yellowfin tuna and 6 bigeye tuna and then released them. 223 tags recaptured by tuna purse seiners and longliners and canneries, which were placed on albacore, bigeye tuna, yellowfin tuna, bluefin tuna, were reported to relevant tuna RFMOs plus the Secretariat of the Pacific Community (SPC). A scientist participated in the SPC tagging program. To facilitate tagging retrieval and to raise awareness of the processing companies and canneries, an advisor from the SPC and scientists from NFRDI visited a tuna processing company and 4 tuna canneries in Korea to provide information on the tuna tagging program and asked for cooperation in retrieving the tags. From 2010, NFRDI started a 5-year research project on the biology and ecology of Pacific bluefin tuna in the Korean waters.

To enhance purse seiners' catch monitoring, the NFRDI is currently developing sampling methods that can be applied to domestic landing ports and canneries, taking the advantage that the canneries are closely located to the landing port of Busan, Masan, Tongyeong and Mokpo.

For fishermen's reference in identifying various target and bycatch species, the NFRDI pulished 'A Field Guide to Bycatch Species in Korean Distant-Water Fisheries' in 2008. It provides Korean tuna fisheries with the color drawings or photos of 333 species of target and non-target species and ecologically related species including sharks, seabirds, sea turtles and cetaceans.

2.3 Statistical data collection system

Tuna catch statistics of Korea are obtained from two sources of data reports. Korea Deep-Sea Fisheries Association (KODEFA) collects total catches by gear types from the Korean tuna industries, which are used as Korea's official total catch. National Fisheries Research and Development Institute (NFRDI) collects logsheet sampling data from vessels. The annual catch estimates for the WCPFC area presented in this report were based on the logsheet data because KODEFA collects data not specifically for the WCPFC area but for the whole Pacific. The logsheet contains location, catches by species, number of hooks, etc.

In accordance with the Distant-water Fisheries Act, fishing vessels are obliged to report the catch statistics to NFRDI when they return to home port. As usual, a fishing trip of tuna vessels lasts more than 20 months and thus it is hard for scientists to collect data from fishing vessels to meet the deadline of data submission set by international fisheries organizations. It is the main reason that the coverage of purse seine and longline fisheries is usually well below 100% at the time of data submission. The coverage is complemented by further collection of logsheets, which make possible changes in catch estimates. In 2009, the columns were set in the logsheet for collecting bycatch species data for 5-6 species of seabirds, sea turtles and sharks. In 2010, it was made possible the logsheet to be submitted electronically, which has increased the catch data collection coverage rates up to more than 70% in longline fisheries and 90% in purse seine fisheries

Table 1. The number of Korean vessels, by gear types and sizes, actually operating in the WCPFC Convention Area for years 2005 to 2009

GRT	Gear	2005	2006	2007	2008	2009
Total	**Longline**	153	130	122	108	111
	Purse seine	28	28	28	28	28
201-500	**Longline**	153	130	122	108	111
501-1000	**Purse seine**	14	14	14	14	14
1001-1500	**Purse seine**	14	13	13	11	11
1500+	**Purse seine**		1	1	3	3

Table 2. Annual catch estimates for the Korean fleets, by gear for the WCPFC Convention Area and whole Pacific Ocean during 2005 to 2009. The catch for 2008 and 2009 is provisional.

Year	Pacific Ocean			WCPFC		
	TOTAL	**PS**	**LL**	**TOTAL**	**PS**	**LL**
2005	258,350	213,212	45,138	248,224	209,790	38,434
2006	293,076	251,790	41,286	280,482	251,790	28,692
2007	298,171	258,177	39,994	281,059	258,177	22,882
2008	286,387	254,316	32,071	280,128	248,802	31,326
2009	320,453	283,278	37,175	314,736	283,278	31,458

Table 3. Annual catch estimates for the Korean purse seiners by primary species, for the WCPFC Convention Area during 2005 to 2009. The catch for 2009 is provisional.

Year	TOT	SKJ	BET	YFT	OTH
2005	204,500	166,280	-	38,202	18
2006	251,790	205,220	28	46,542	-
2007	258,177	214,933	-	43,244	-
2008	248,802	187,277	45	61,480	-
2009	283,278	257,481	135	25,652	10

Table 4. Annual catch estimates for the Korean longliners by primary species, for the WCPFC Convention Area during 2005 to 2009. The catch for 2008 and 2009 is provisional.

Year	TOT	ALB	YFT	BET	BFT	SKJ	BUM	STM	SWO	BLM	SAI	OTH
2005	38,356	3,919	13,329	15,622	-	1	4,120	260	737	272	91	5
2006	28,692	2,430	9,529	12,489	-	1	3,301	171	708	42	14	7
2007	22,882	1,433	8,817	10,054	6	1	166	54	245	1,693	-	413
2008	31,321	1,481	7,847	17,002	-	-	402	59	1,206	1,966	-	1,358
2009	31,438	1,601	9,312	15,239	-	-	506	60	1,190	1,669	-	1,861

Table 5. Korean scientific observers reported the catch (number of individual) of ecologically related species by Korean purse seine and longline fisheries in the WCPFC Convention Area in 2009.

	Blue shark	Silky shark	Bigeye thresher shark	Longfin mako	Oceanic white-tip shark	Whale shark	Olive ridley sea turtle
Purse seine		76				4	2
Longline	91	1	41	4	4		

Table 6. Catch (mt) and CPUE (mt/set) by school types of the Korean tuna purse seine fisheries during the scientific observation in 2009

School type	No. of sets	No. of Success sets rate (%)	Skipjack		Yellowfin		Bigeye		Others		Total	
			Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
Free-swimming school	52	40 (77 %)	1,386.3	26.7	217.5	4.2	2.9.	0.05	8.0	0.15	1,614.7	31.1
Log-associated school	13	13 (100 %)	310.0	23.8	43.1	3.3	4.5	0.34	1.0	0.08	358.5	27.6
Total	65	53	1,696.3	26.1	260.6	4.0	7.4	0.11	9.0	0.14	1973.2	30.4

Table 7. List of non-target species by school types caught by the two Korean tuna purse seiners during the scientific observation in 2009

Species name	Free-swimming school		Log-associated school	
	Number	Weight (Kg)	Number	Weight (Kg)
Blue marlin	4	355.0		
Indo-pacific marlin	16	757.0		
Indo-pacific sailfish	1	30.0		
Silky shark	26	916.1	50	300.3
Whale shark	4	5,287.0		
Devil ray	8	455.0		
Pelagic stingray	1	2.0		
Banded cavalla			1	0.1
Brown leatherjacket			1	0.2
Bullet tuna	7	9.1	1	1.9
Butterfish			2	0.2
Dolphinfish	4	8.3	11	50.7
Figered leatherjacket			1	0.6
Flyingfish	1	0.5		
Great barracuda	4	38.2	1	13.0
Mackerel scad	1	0.3	46	10.9
Niddlefish	1	0.7	3	3.1
Ocean trigger fish	6	3.3	20	10.6
Rainbow runner	8	27.7	54	137.5
Shark sucker	1	1.1		
Sharptail mola	2	34.1	2	34.1
Unicorn leatherjacket			2	2.3
Wahoo	3	13.1	6	35.3
Olive ridley sea turtle	2	12.9		
Total	100	7,951.4	201	600.8
No. of species	19		15	

Table 8. Catch and CPUE of tunas and billfishes by the tuna longliner during the scientific observation in 2009

Species	Catch				CPUE	
	No.	Ratio (% in no.)	Weight (kg)	Ratio (% in weight)	No./100hooks	kg/100hooks
Bigeye tuna	191	10.71	5,989	13.56	0.15	4.57
Yellowfin tuna	833	46.69	22,766	51.53	0.64	17.37
Albacore	615	34.47	10,725	24.28	0.47	8.18
Blue marlin	110	6.17	4,253	9.63	0.08	3.24
Skipjack tuna	3	0.17	23	0.05	0.00	0.02
Swordfish	17	0.95	210	0.48	0.01	0.16
Shortbill spearfish	13	0.73	162	0.37	0.01	0.12
Striped marlin	1	0.06	30	0.07	0.00	0.02
Indo-Pacific sailfish	1	0.06	22	0.05	0.00	0.02
Total	1,784	100	44,180	100	1.36	33.71

Table 9. List of non-target species by the tuna longliner during the scientific observation in 2009

Species name	No. of fish	Ratio (%, no.)	CPUE(no./100hooks)
Longfin mako	4	0.25	0.00
Bigeye thresher shark	41	2.60	0.03
Blue shark	91	5.76	0.07
Oceanic white-tip shark shark	4	0.25	0.00
Silky shark	1	0.06	0.00
Pelagic stingray	187	11.84	0.14
Pomfret	2	0.13	0.00
Escolar	93	5.89	0.07
Snake mackerel	1,005	63.65	0.77
Wahoo	61	3.86	0.05
Lancetfish	77	4.88	0.06
Great barracuda	9	0.57	0.01
Dolphin fish	2	0.13	0.00
Slender sunfish	1	0.06	0.00
Rainbow runner	1	0.06	0.00
Total	1,579	100	1.20

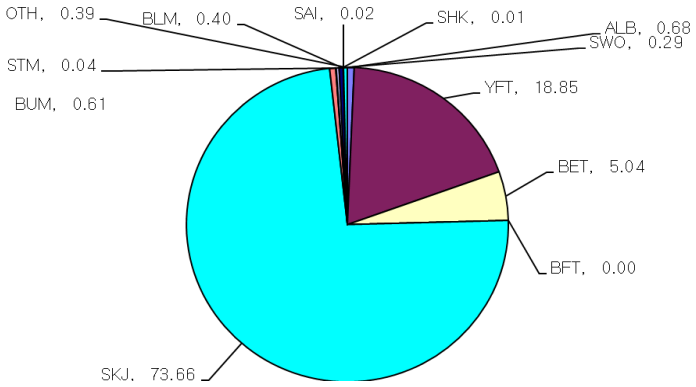

Fig. 1. Catch composition (averaged 2005-2009) of Korean tuna fisheries.

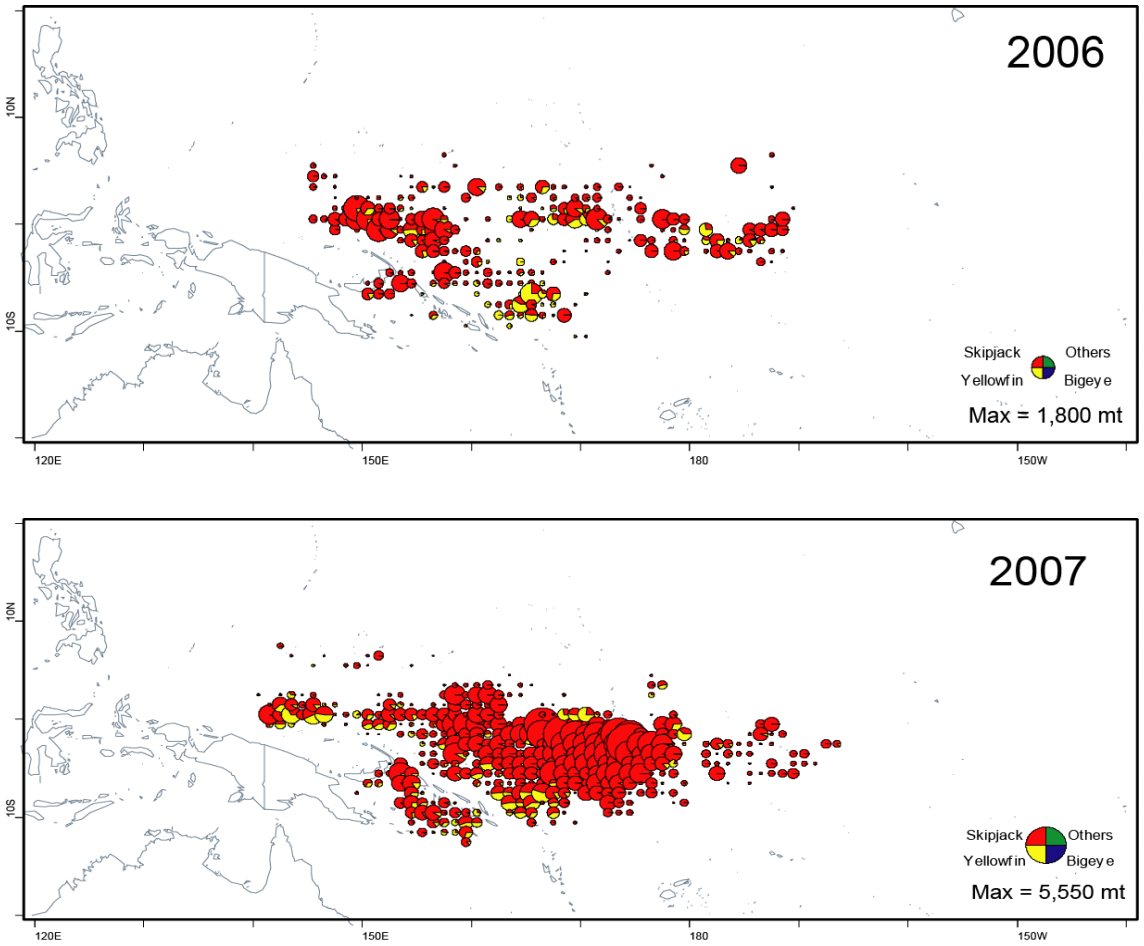

Fig. 2 Distribution of Korean tuna purse seiners operating in the Pacific Ocean.

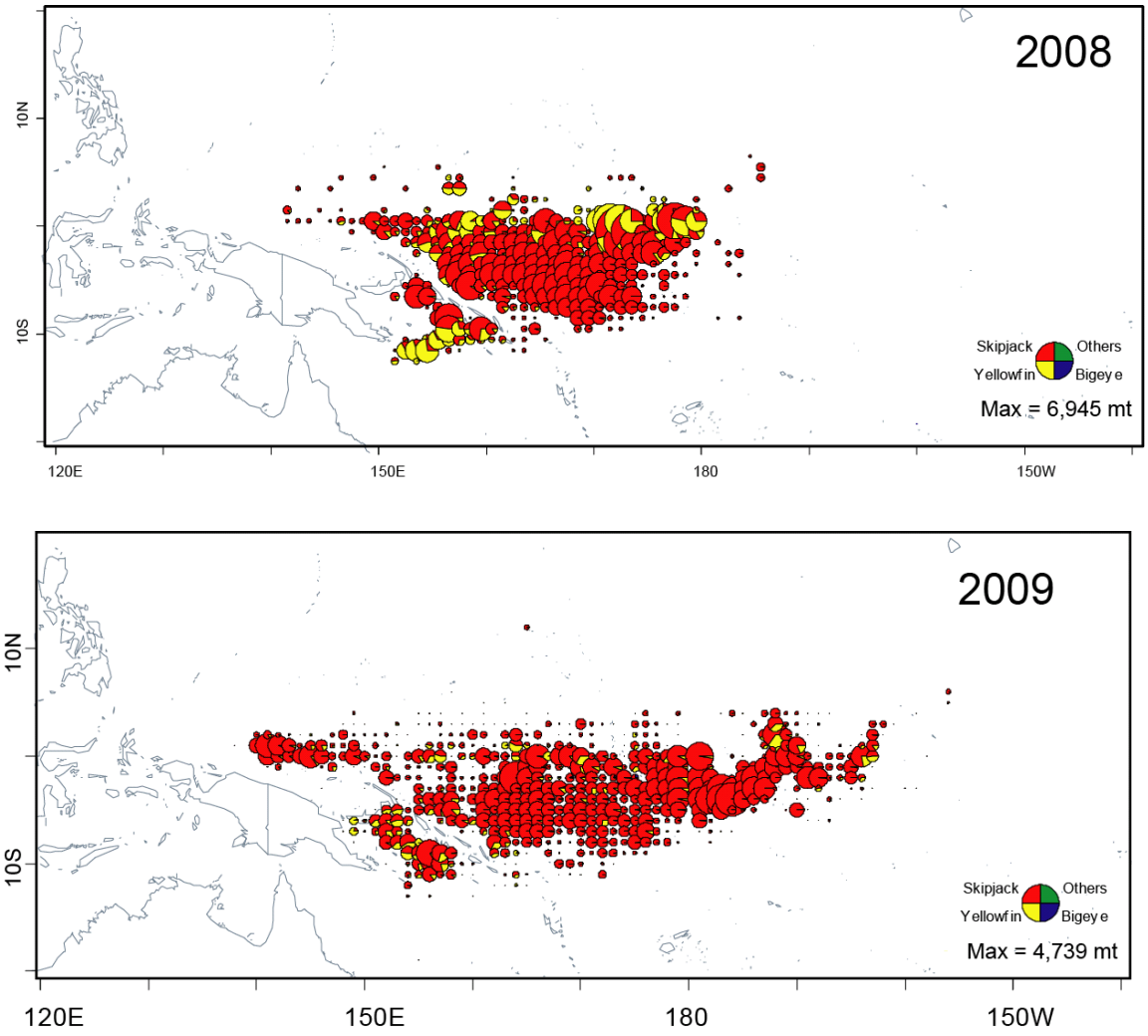

Fig. 2. Continued.

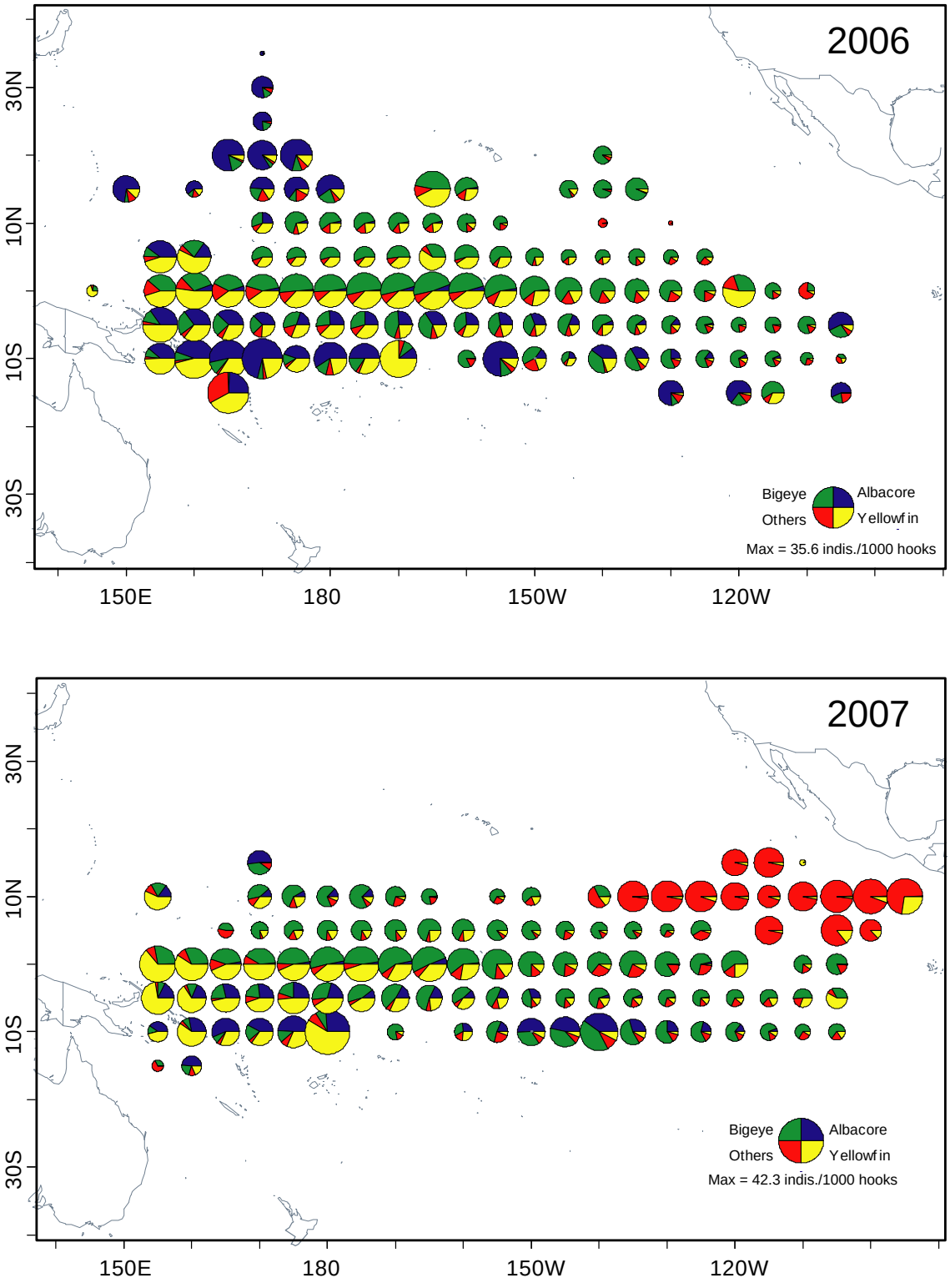

Fig. 3. Distribution of Korean tuna longliners operatinging in the Pacific Ocean

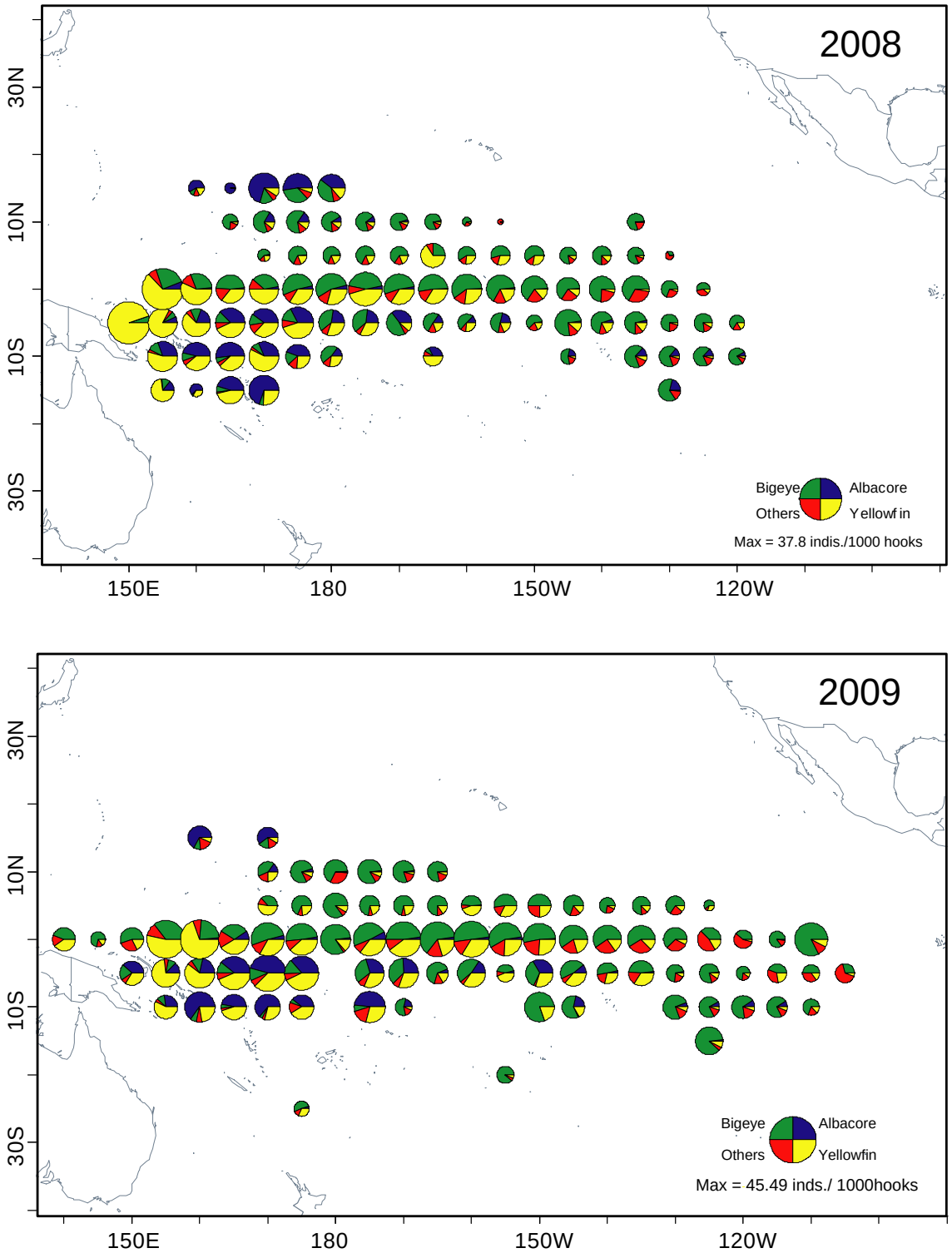

Fig. 3. continued

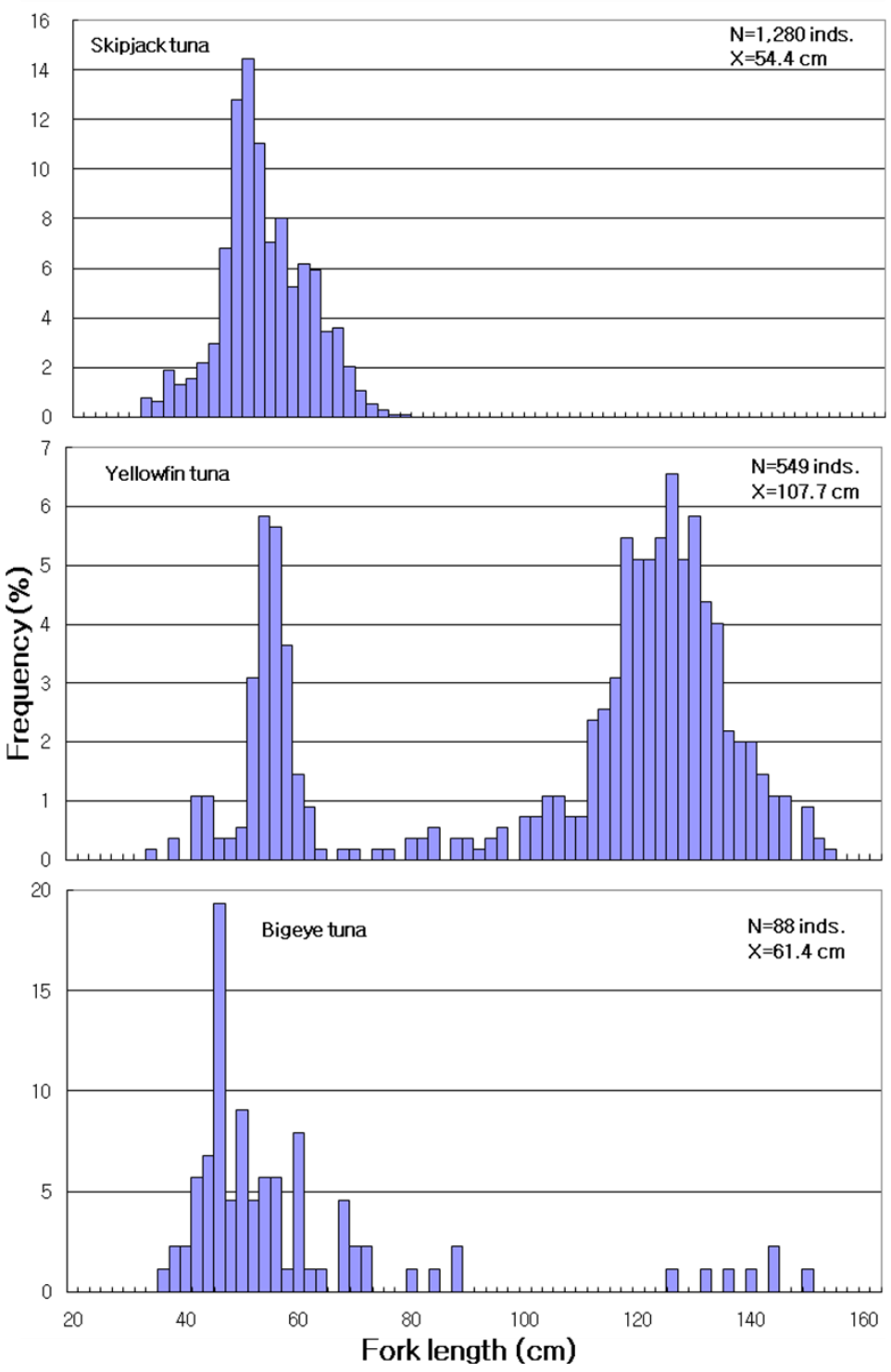

Fig. 4. Length frequency distributions of tunas caught by free-swimming school in 2009.

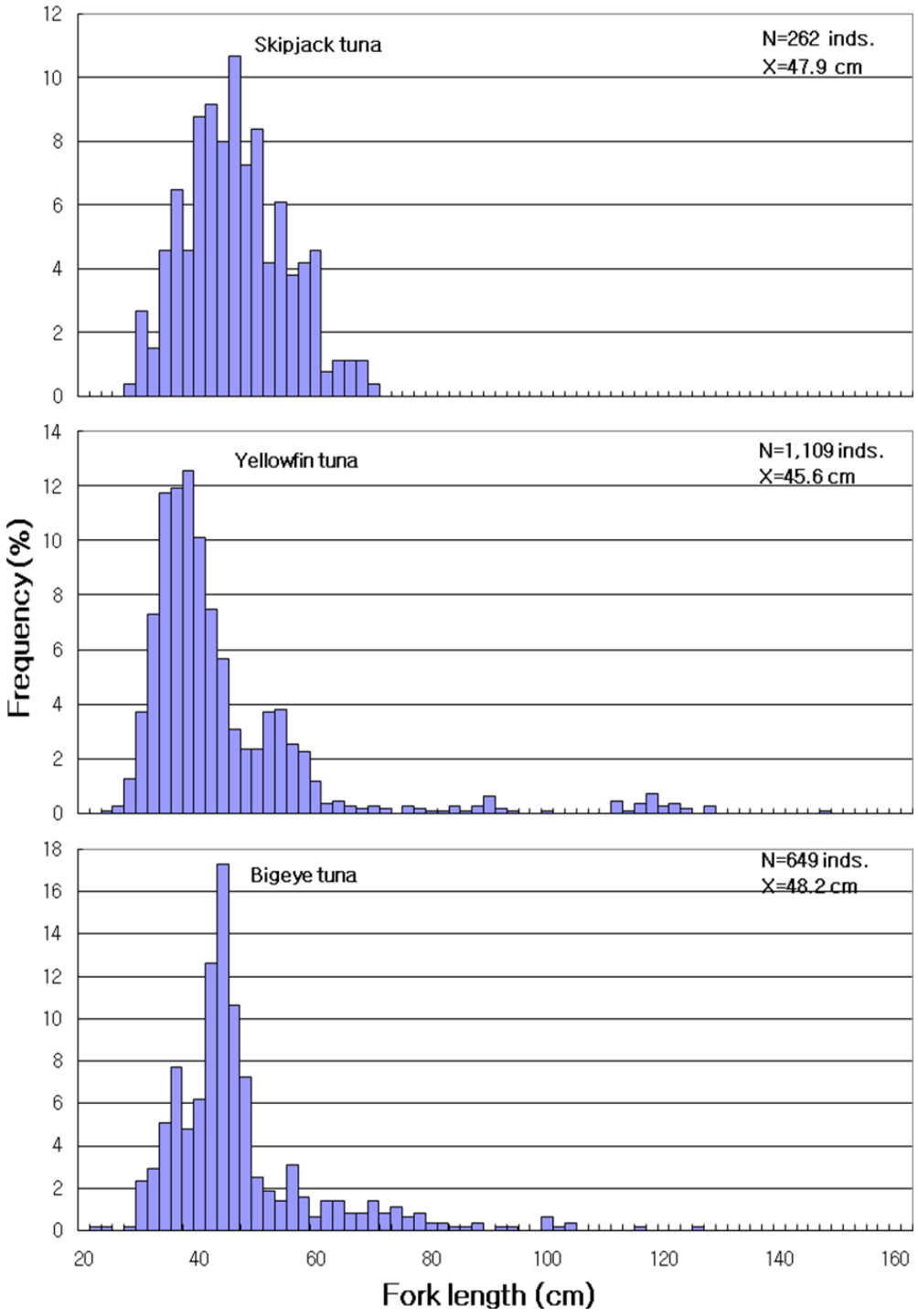

Fig. 5. Length frequency distributions of tunas caught by log-associated school in 2009.

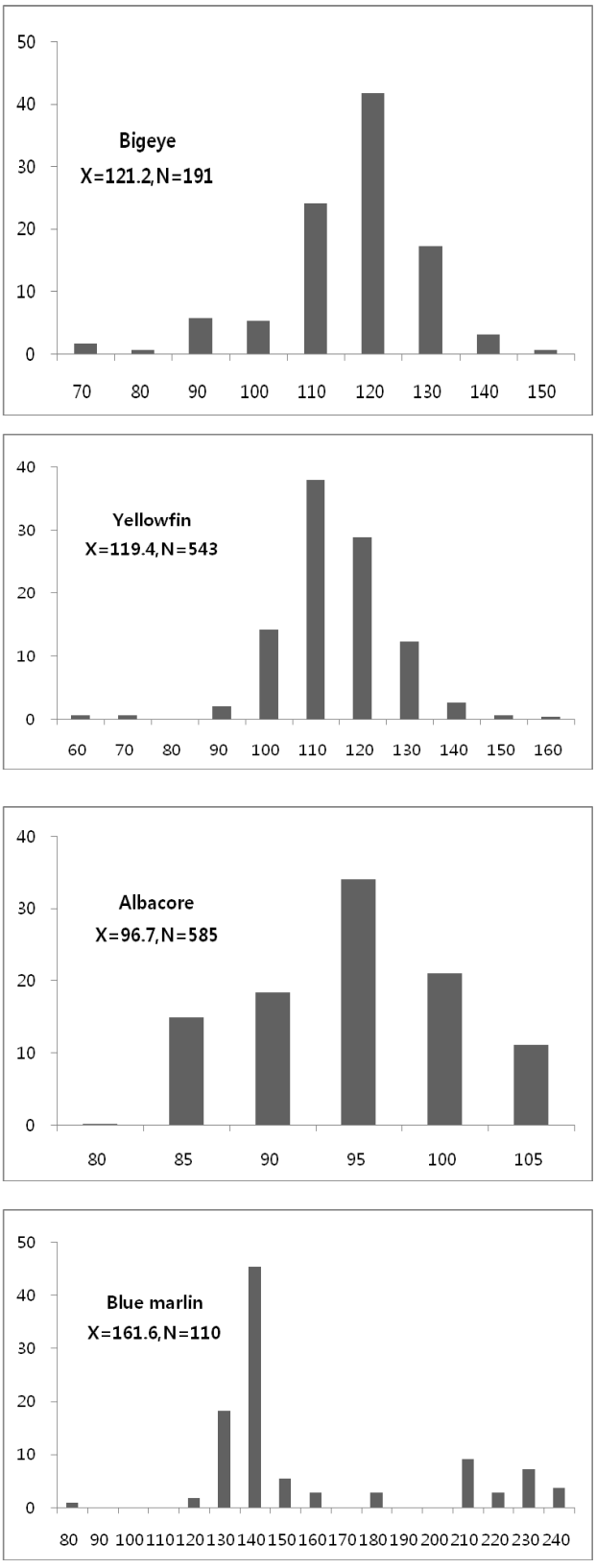

Fig. 6. Length frequency distributions of tunas and blue marlin caught by Korean tuna longline fishery, 2009.