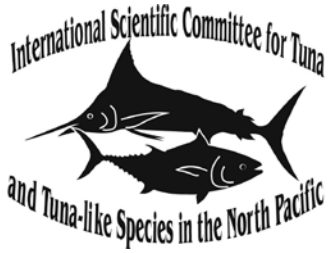

9th Meeting of the ISC
July15-20, 2009
Kaohsiung, Taiwan

9th Meeting of the
International Scientific Committee
for Tuna and Tuna-Like Species in the North Pacific Ocean
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National Report of Korea[1]

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Catch data updates of tuna and tuna like species in the North Pacific in Korea

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Abstract

Since tunas and tuna-like species in the North Pacific have been mostly caught by distant-water tuna longliners and purse seiners, the catch data of the distant-water tuna fishery have been reported in the formal database system of the Ministry for Food, Agriculture, Forestry & Fisheries (MIFAFF) and National Fisheries Research & Development Institute (NFRDI) of Korea.

Total annual catch of tunas and tuna-like species by Korean distant-water longline fishery in the North Pacific ranged between 60 and 34,080 tons and averaged 15,103 tons during 1972-2008. Generally, major species caught by the longliners in the North Pacific were bigeye tuna (47.1%) and yellowfin tuna (27.8%). The annual catch of bigeye tuna by the longliners generally tended to increase during 1972-2008, while the annual catch of yellowfin tuna steadily decreased after the mid 1990s. In 2008, the catches of bigeye and yellowfin tunas by the longliners were 12,285 and 2,302 tons, respectively.

The majority of the catch of the distant-water purse seine fishery were skipjack and yellowfin tunas during 1980-2008. Total annual catch of Korea distant-water purse seine fishery tended to decrease after a peak at 100,687 tons in 2003. The annual catch of skipjack tuna by the purse seiners peaked at 88,654 tons in 2003, and then decreased. In recent years, the annual catch of yellowfin tuna by the purse seiners fluctuated around 10,000 tons.

Pacific bluefin tuna in Korea has been mainly caught by Korean domestic offshore purse seine as by-catch in the Korean waters. The number of fleets for the offshore purse seiners has been gradually decreased since 1994. The catch of Pacific bluefin tuna peaked at 2,141 tons in 2003, and then rapidly decreased. Pacific bluefin tuna was generally caught during all seasons. Annual mean fork length of Pacific bluefin tuna during 2000-2008 tended to increase. In particular, in 2008, two modes of larger fish appeared in the length-frequency distribution of Pacific bluefin tuna. The main fishing ground of Pacific bluefin tuna was around Jeju Island.

Introduction

The status of distant-water tuna fishery until 2007 was described in the report of the 8th International Scientific Committee on Tuna and Tuna-like Species in the North Pacific (ISC) meeting in 2008 (Hwang *et al.*, 2008). This paper provides more recent information on the fishery catch of tuna and tuna-like species in the North Pacific.

The Korean government initiated the fisheries observer programs for both domestic and international distant-water fisheries in 1998 and 2002, respectively. In 2008, nine international scientific observes were dispatched 13 times for distant-water fisheries, and this number will be increased in future. The National Fisheries Research & Development Institute (NFRDI) has collected the fishing and biological data from logbooks and reports of observers from fishing vessels of the domestic and distant-water fisheries to construct a database.

The catch of Pacific bluefin tuna by distant-water tuna fishery in the North Pacific has been small. However, in most recent years, the information on the catch of Pacific bluefine tuna in the Korean waters was requested from ISC. Therefore, this paper describes temporal and spatial variations in the catch of Pacific bluefin tuna by Korean domestic offshore fishery to provide basic information on the catch of Pacific bluefin tuna in the Korean waters.

Data source

Most tunas and billfishes in the North Pacific were caught by distant-water tuna longliners and purse seiners. The formal catch statistics on distant-water tuna fishery in the Pacific Ocean have been compiled and reported in “Fishery Production Survey” by the Ministry for Food, Agriculture, Forestry & Fisheries (MIFAFF). The National Fisheries Research & Development Institute (NFRDI) has also the database system (named OFIRIS) which compiles the logbook data collected from the Korean tuna longliners and purse seines operating in the Pacific Ocean. The coverage of NFRDI database is about 70% of the formal catch statistics from MIFAFF.

The catch data of the North Pacific requested by ISC were derived by multiplying the catch data for the entire Pacific recorded in the Fishery Production Survey by the ratio of catch for the North Pacific estimated from the logbook compiled in the OFIRIS. Conversion factors described in the report of 14th meeting of SCTB were used to estimate the whole weight from the processed weight in tunas and tuna like species.

Pacific bluefin tuna in the Korean waters caught by Korean domestic offshore purse seiners as by-catch is mostly exported to Japanese markets. The catch levels of pacific bluefin tuna in Korean waters during 1982-1999 were estimated from Japanese import records of Korean

bluefin tuna, and derived from the monthly sales slips of the Korean domestic purse seine fisheries cooperatives during 2000-2004. The catch of Pacific bluefin tuna recorded in the sales slips accounted for about 90% of the catch of Pacific bluefin tuna by the offshore purse seine. The tuna catch data in Korean waters reported by MIFAFF and NFRDI had not been classified by species until 2004. However, the monthly catch data of Pacific bluefin tuna since 2005 have been compiled in the database system (OFIRIS) of the NFRDI. The catch data of pacific bluefin tuna extracted from the OFIRIS were used for this paper. The unit of catch is metric tons (round weight), and the unit of fishing effort of the offshore purse seine fishery is the official number of fleets permitted by the Korean government. Size frequency data of Pacific bluefin tuna were obtained from port sampling conducted by observers.

Catch of distant-water tuna longline in the North Pacific

Total annual catches of tunas and tuna-like species by the Korean distant-water longline fishery in the Northern Pacific from 1972 to 2008 have been ranged between 60 tons in 1973 and 34,080 tons in 1975, and the total annual catches after 1989 were more than 10,000 tons (Table 1).

Generally, the major species caught by longliners in the North Pacific were bigeye and yellowfin tunas. The catch of bigeye and yellowfin tunas accounted for 47.1% and 27.8%, respectively, of the total catch of the longline fishery during 1972-2008. Although the annual catches of bigeye tuna generally tended to increase during 1972-2008 with large interannual fluctuations in catch, the annual catches of yellowfin tuna steadily decreased after the mid 1990s and fell to 2,302 tons in 2008 (Fig 1). The annual catch of albacore showed large interannual changes from the mid 1970s to the mid 1980s with a peak in 1975 at 9,575 tons, and then the annual catch rapidly decreased (Fig 1). The catch of albacore in 2008 was 365 tons. The annual catches of billfishes summed in blue marlin, striped marlin, swordfish, black marlin and sailfish after 1988 tended to increase (Fig 1). The mean catch of billfishes in 2000s was 1,612 tons.

Catch of distant-water tuna purse seiners in the North Pacific

The majority of the catch of the distant-water purse seine fishery were skipjack and yellowfin tunas during 1980-2008 (Table 2). In particular, skipjack tuna was usually the largest component of the catch (Table 2). Total annual catches of Korea distant-water purse seine fishery tended to decrease after a peak at 100,687 tons in 2003 (Table 2). Though provisional, the catch of Korea distant-water purse seine fishery in 2008 was 16,809 tons (Table 2).

The annual catch of skipjack tuna peaked at 88,654 tons in 2003, and then decreased (Fig.

2). On the other hand, the catches of yellowfin tuna reached a peak 28,570 tons in 1993, then rapidly fell to 4,263 tons in 1996, but rebounded to about 23,000 in 1998/1999. In recent years, the catch of yellowfin tuna fluctuated around 10,000 tons (Fig. 2).

Catches of Pacific bluefin tuna by domestic purse seine fishery in the offshore of Korea

A typical fleet of the Korean domestic offshore purse seiners consisted of one main vessel (128 international gross tonnage, 35-m length) and two light boats (55-88 international gross tonnage, 27-35-m length) (Hwang *et al*., 2008).

The number of fleets for the offshore purse seiners has been gradually decreased since 1994 (Table 3). The number of fleets after 2002 was 29 (Table 3). Gear types during 1982- 1999 were unknown, but the major gear was probably purse seine. The annual catches of Pacific bluefin tuna after 1994 tended to increase with large interannual fluctuations in catch. The catch of Pacific bluefin tuna peaked at 2,141 tons in 2003 (Table 3). In addition, Pacific bluefin tuna was generally caught during all seasons. (Table 4, Fig. 3).

The quarterly catch ratios from 2000 to 2007 were estimated from the monthly catch data of purse seiners shown in Table 4 and Fig. 3. The quarterly catch ratios greatly differed among years, and this could be because Pacific bluefin tuna is not a target species in the Korean domestic purse seine fishery. Due to such much difference of the quarterly catch ratios among years, to extrapolate quarterly catch before 2000 by using quarterly mean catch ratios since then as suggested by Oshima *et al*.(2008) is not applicable to the case Korea.

The fork length of Pacific bluefin tuna caught by the offshore purse seiners in the Korean waters ranged from 20 cm to 187 cm during 2000-2008 (Fig. 4). A strong mode at 27 in 2000 progressed to about 50 cm by 2002 (Fig. 4). Length-frequency distribution in 2003 had dominant modes at 30 cm, 40 cm and 64 cm, and then had several modes between about 30 to 80 cm (Fig. 4). In particular, in 2008, two week modes at 120 and 150 cm in fork length appeared in the length-frequency distribution (Fig. 4). Annual mean fork length of Pacific bluefin tuna during 2000-2008 tended to increase, reaching a peak in 2008 at 57.2 cm (Fig. 4).

The main fishing ground of Pacific bluefin tuna generally was around Jeju Island (Fig. 5). However, in 2005 and 2007, additional fishing grounds were apparently formed around Tsushima Island (Fig. 5).

Research activities

The fisheries statistics data have been collected and compiled by the MIFAFF and NFRDI. Additionally, biological sampling has been regularly made on the boats and at domestic landing sites.

NFRDI constructed a relational database system for easy access and analysis of fisheries data. Old data files will be verified and corrected. NFRDI initiated the international fisheries observer program for distant-water fisheries including tuna fisheries in 2002 and for domestic fisheries in 1998. In 2008, nine international scientific observes were deployed 12 times on Korean fishing vessels to monitor catch of target and by-catch species. To reduce mortality of seabird and sea turtle caused by tuna longline vessels, guidebooks such as “Field Guide to Bycatch Species in Korean Distant-Water Fisheries” and “Fishes of the Pacific Ocean (3rd Edition)” and posters providing the basic information on these species were distributed to fishing boats including the tuna longliners.

There have been very few studies on Pacific bluefin tuna in Korea. This could be due to low catch level of Pacific bluefine tuna in Korea. However, recent years have seen a renewal of interest in ecological characteristics of Pacific bluefin tuna caught in the Korean waters in response to the recent increase of catch of the species in the Korean waters. NFRDI established a research project on biological and ecological research and stock assessment of Pacific bluefin tuna for the next five years. This research project will provide information relevant to stock assessment and management of Pacific bluefin tuna in the Korean waters.

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Table 1. Annual catches of tunas and tuna-like species by the Korean distant-water longline fishery in the North Pacific.

(unit : tons)

YEAR	Albacore	Yellowfin tuna	Bigeye tuna	Bluefin tuna	Skipjack	Blue Marlin	Striped Marlin	Sword fish	Black Marlin	Sailfish	Others	Total
1972	0	134	181	0	58	0	0	0	0	0	0	374
1973	3	4	7	0	22	0	0	0	0	0	23	60
1974	114	4,435	4,786	0	1,297	0	0	0	0	0	1,100	11,743
1975	9,575	7,804	5,091	6	4,531	0	0	0	0	0	6,972	34,080
1976	2,576	7,048	3,905	14	82	0	0	0	0	0	1,614	15,335
1977	459	8,961	7,623	0	85	282	43	219	38	245	329	18,374
1978	1,006	3,827	3,922	0	47	248	28	68	68	26	249	9,524
1979	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1980	402	1,712	1,748	0	18	66	37	64	41	715	85	5,010
1981	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1982	5,462	4,355	5,852	0	30	102	39	48	27	565	2,313	18,979
1983	911	2,279	4,414	0	1	45	19	11	26	558	1,447	9,869
1984	2,490	5,578	8,751	20	9	90	23	48	43	113	2,109	19,391
1985	1,188	1,710	2,433	0	3	114	16	24	21	0	311	5,875
1986	923	2,439	3,204	0	4	7	61	9	21	3	1,427	8,127
1987	607	6,443	9,010	26	4	37	1	44	19	4	1,430	17,665
1988	175	2,931	5,607	4	2	42	11	27	3	0	967	9,808
1989	27	4,759	7,858	29	2	54	26	40	235	92	1,193	14,384
1990	1	2,710	7,093	0	2	44	315	61	554	213	1,655	12,702
1991	0	3,419	6,438	0	0	2	141	5	146	445	721	11,317
1992	1	4,044	8,634	0	0	1	318	8	185	221	1,970	15,394
1993	21	3,954	4,971	0	1	10	388	15	115	246	2,823	12,569
1994	54	4,818	6,729	0	0	152	1,045	66	93	1,294	1,962	16,394
1995	14	7,107	9,951	0	0	1	307	10	251	221	2,926	20,802
1996	158	5,358	4,296	0	1	10	429	15	126	244	1,639	12,363
1997	404	5,475	7,353	0	0	145	1,017	100	78	1,292	4,472	20,977
1998	226	3,871	15,425	0	0	335	635	153	146	382	6,796	28,979
1999	99	4,307	8,490	0	0	165	433	132	408	198	2,499	17,505
2000	15	4,460	6,851	0	2	96	537	202	186	127	4,016	17,355
2001	64	5,747	10,071	0	2	166	254	438	895	28	5,203	23,368
2002	112	3,137	10,786	0	0	152	188	439	479	123	1,400	17,001
2003	146	4,741	9,739	0	6	159	206	381	819	129	931	17,352
2004	78	5,145	12,468	0	101	227	75	410	919	1	404	19,835
2005	420	2,958	9,254	0	35	304	136	404	997	0	820	15,340
*2006	138	5,121	11,593	0	0	217	56	477	1,094	0	961	19,657
*2007	56	2,222	9,703	0	0	120	48	460	882	0	192	13,684
*2008	365	2,302	12,285	0	0	215	31	914	518	0	790	17,424

* provisional

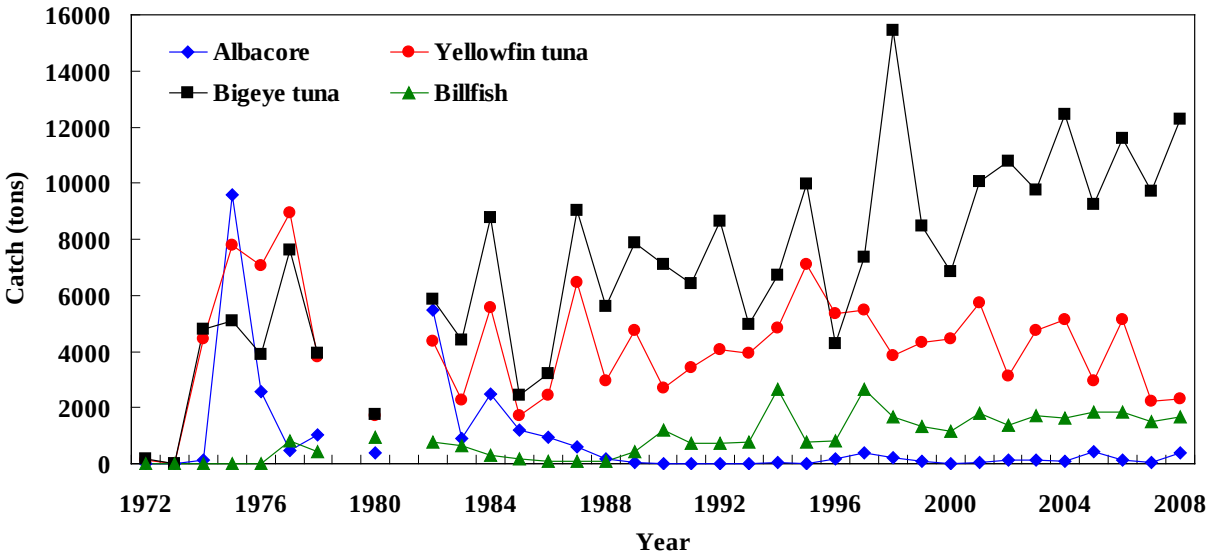

Fig. 1. Annual catches of albacore, yellowfin tuna, bigeye tuna and billfish caught by the Korean distant-water tuna longline fisheries in the North Pacific. The catch of billfish includes blue marlin, striped marlin, swordfish, black marlin and sailfish.

Table 2. Annual catches of tunas by the Korean distant-water purse seine fishery in the North Pacific.

(unit : tons)

YEAR	Skipjack tuna	Bigeye tuna	Yellowfin tuna	Others	Total
1980	476	0	74	0	550
1981	1,462	0	635	0	2,097
1982	8,838	0	1,854	0	10,692
1983	10,314	0	519	0	10,833
1984	10,893	0	285	0	11,179
1985	8,590	0	0	0	8,590
1986	21,334	0	2,264	0	23,597
1987	23,119	190	11,818	0	35,127
1988	46,139	0	11,265	0	57,404
1989	27,372	139	10,184	0	37,695
1990	35,609	33	8,037	0	43,679
1991	53,585	3	18,344	0	71,932
1992	29,057	3	18,569	0	47,628
1993	34,594	0	28,570	0	63,164
1994	50,603	0	15,887	5	66,494
1995	65,069	0	17,503	0	82,572
1996	62,361	0	4,263	0	66,624
1997	38,696	0	11,370	0	50,066
1998	72,433	106	23,193	0	95,732
1999	83,292	0	23,102	0	106,394
2000	51,603	0	10,773	0	62,376
2001	82,889	0	17,719	0	100,608
2002	64,897	0	16,389	0	81,286
2003	88,654	319	11,715	0	100,687
2004	43,985	48	7,327	0	51,360
2005	48,059	0	10,562	0	58,621
2006	70,944	13	16,009	0	86,965
*2007	18,373	0	3,609	0	21,982
*2008	8,976	4	7,830	0	16,809

*provisional

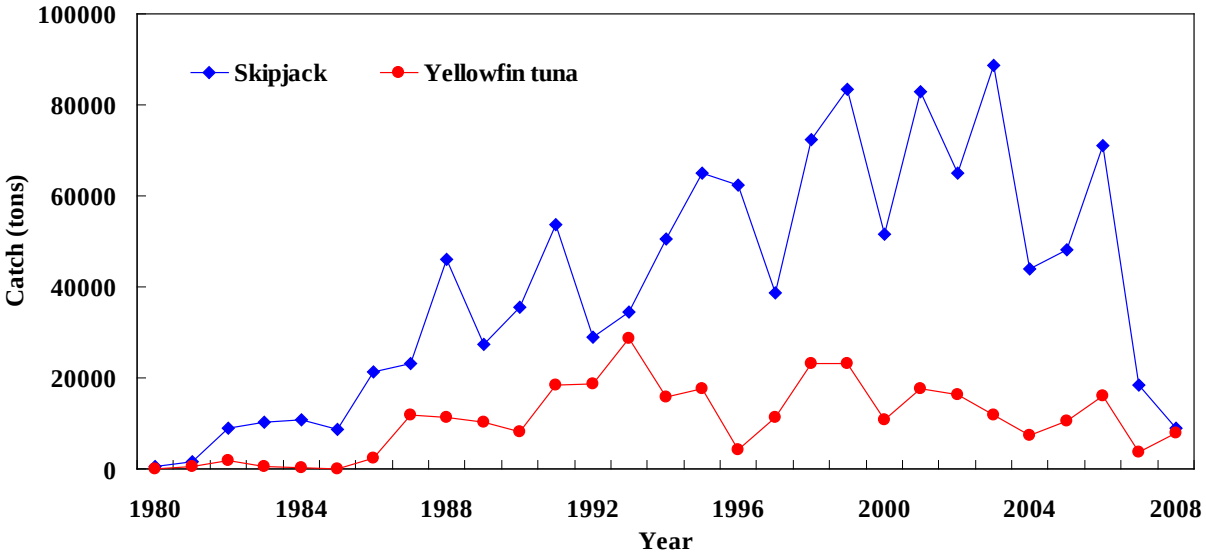

Fig. 2. Annual catches of skipjack and yellowfin tunas caught by the Korean distant-water tuna purse seine in the North Pacific.

Table 3. Annual catch of Pacific bluefin tuna by offshore purse seine in Korea.

Year	Gear type	Catch (ton)	Permitted number of fleets
1982	(ps)	31	48
1983	(ps)	13	48
1984	(ps)	4	48
1985	(ps)	1	48
1986	(ps)	344	48
1987	(ps)	89	48
1988	(ps)	32	48
1989	(ps)	71	48
1990	(ps)	132	48
1991	(ps)	265	48
1992	(ps)	288	48
1993	(ps)	40	48
1994	(ps)	50	48
1995	(ps)	821	36
1996	(ps)	102	36
1997	(ps)	1,054	36
1998	(ps)	188	36
1999	(ps)	256	36
2000	ps	1,976	32
2001	ps	968	32
2002	ps	767	32
2003	ps	2,141	29
2004	ps	636	29
2005	ps	1,085	29
2006	ps	833	29
2007	ps	1,054	29
2008	ps	1,536	29

※ Gears were unknown during 1982-1999, but probably purse seine.

※ The catch data of Pacific bluefin tuna since 2005 was extracted from OFIRIS.

Table 4. Monthly catch of Pacific bluefin tuna by offshore purse seine in Korea.

Year	Quarter	Month	Permitted number of fleets	Catch (ton)
2000	1	1	32	100
2000	1	2	32	128
2000	1	3	32	386
2000	2	4	32	555
2000	2	5	32	100
2000	2	6	32	660
2000	3	7	32	23
2000	3	8	32	2
2000	3	9	32	0
2000	4	10	32	11
2000	4	11	32	7
2000	4	12	32	4
2001	1	1	32	29
2001	1	2	32	279
2001	1	3	32	482
2001	2	4	32	85
2001	2	5	32	54
2001	2	6	32	5
2001	3	7	32	3
2001	3	8	32	0
2001	3	9	32	2
2001	4	10	32	10
2001	4	11	32	5
2001	4	12	32	13
2002	1	1	32	8
2002	1	2	32	40
2002	1	3	32	83
2002	2	4	32	91
2002	2	5	32	28
2002	2	6	32	26
2002	3	7	32	375
2002	3	8	32	22
2002	3	9	32	23
2002	4	10	32	71
2002	4	11	32	1
2002	4	12	32	1
2003	1	1	29	31
2003	1	2	29	90
2003	1	3	29	75
2003	2	4	29	210
2003	2	5	29	62
2003	2	6	29	52
2003	3	7	29	21
2003	3	8	29	20
2003	3	9	29	31
2003	4	10	29	1,472
2003	4	11	29	74
2003	4	12	29	2
2004	1	1	29	15
2004	1	2	29	5
2004	1	3	29	23
2004	2	4	29	16
2004	2	5	29	135
2004	2	6	29	306
2004	3	7	29	23
2004	3	8	29	12
2004	3	9	29	13
2004	4	10	29	42
2004	4	11	29	1
2004	4	12	29	44
2005	1	1	29	218
2005	1	2	29	70
2005	1	3	29	304
2005	2	4	29	145

2005	2	5	29	58
2005	2	6	29	15
2005	3	7	29	60
2005	3	8	29	98
2005	3	9	29	23
2005	4	10	29	52
2005	4	11	29	12
2005	4	12	29	30
2006	1	1	29	81
2006	1	2	29	16
2006	1	3	29	84
2006	2	4	29	248
2006	2	5	29	13
2006	2	6	29	18
2006	3	7	29	3
2006	3	8	29	285
2006	3	9	29	3
2006	4	10	29	73
2006	4	11	29	3
2006	4	12	29	6
2007	1	1	29	106
2007	1	2	29	143
2007	1	3	29	61
2007	2	4	29	4
2007	2	5	29	0
2007	2	6	29	6
2007	3	7	29	59
2007	3	8	29	27
2007	3	9	29	12
2007	4	10	29	8
2007	4	11	29	9
2007	4	12	29	619
2008	1	1	29	161
2008	1	2	29	116
2008	1	3	29	201
2008	2	4	29	497
2008	2	5	29	276
2008	2	6	29	52
2008	3	7	29	37
2008	3	8	29	4
2008	3	9	29	10
2008	4	10	29	32
2008	4	11	29	31
2008	4	12	29	118

※ The catch data of Pacific bluefin tuna since 2005 was extracted from OFIRIS.

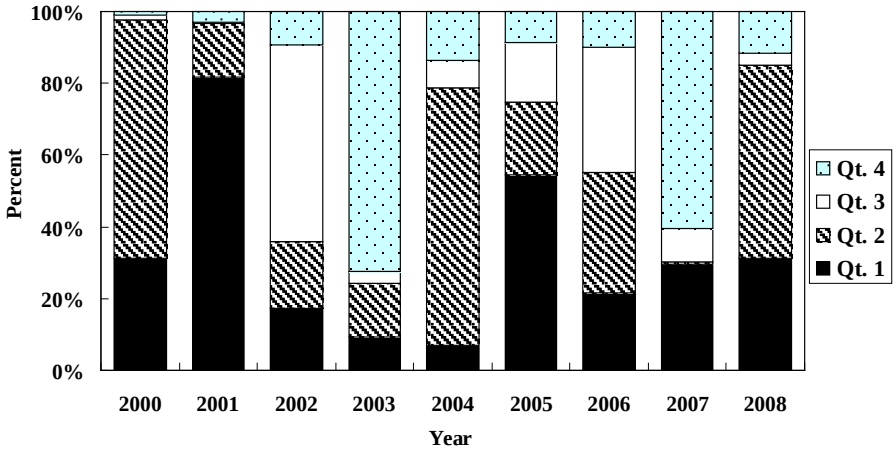

Fig. 3. Annual changes of quarterly catch ratios of Pacific bluefin tuna in Korea.

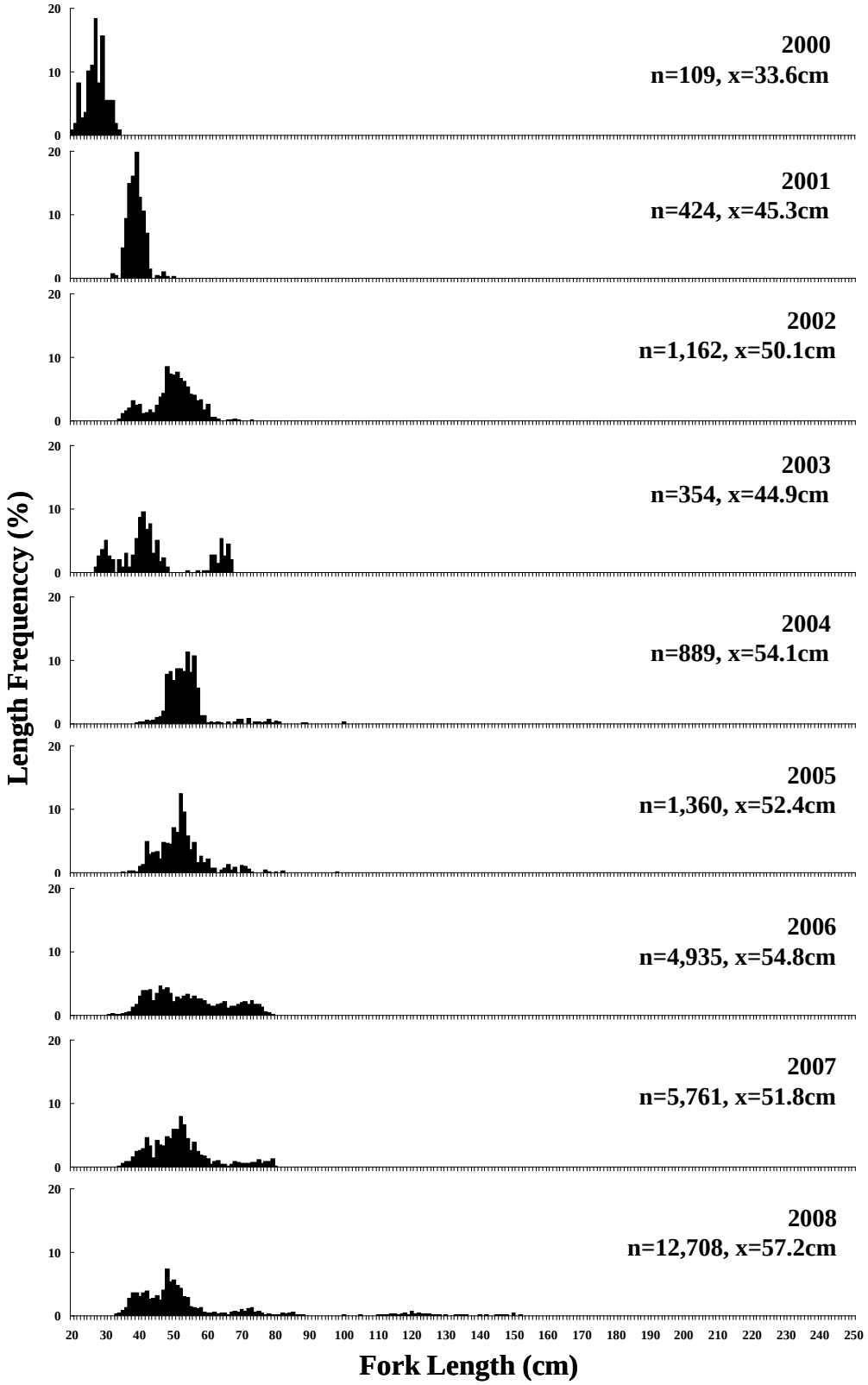

Fig. 4. Length-frequency distributions of Pacific bluefin tuna landed by the Korean domestic purse seine fishery from 2000 to 2008.

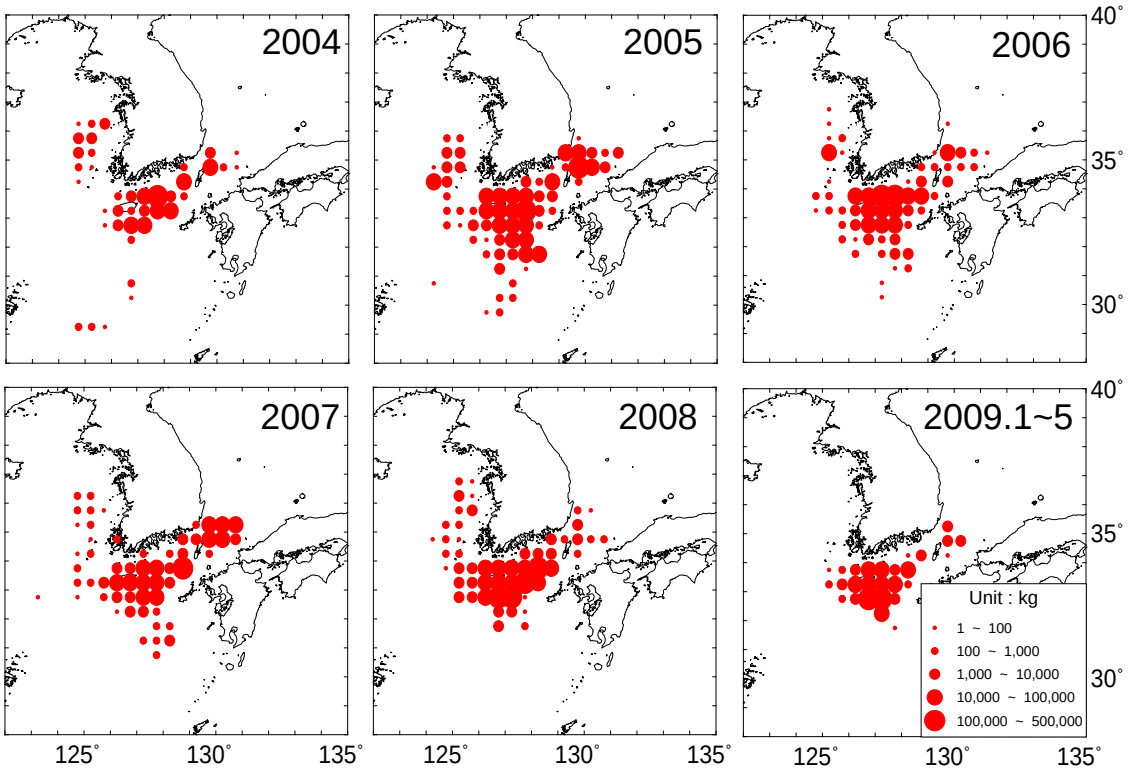

Fig. 5. Horizontal distributions of Pacific bluefin tuna caught by the Korean domestic purse seine fishery from 2004 to 2009 January-May.