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National Tuna Fisheries Report of Japan

Fisheries Agency of Japan

and

Fisheries Research Agency
National Research Institute of Far Seas Fisheries (NRIFSF)

SUMMARY

This paper describes recent trends in the Japanese tuna and billfish fishing activities by longline, pole-and-line, purse seine and other fisheries mostly in the WCPFC Convention Area (WCP-CA), including fleet size, catch and fishing effort statistics. The total number of longline vessels was 1,208 in 2006, which was 25 vessels (2%) less than that of 2005. For the pole-and-line vessel, total number of the vessels was 335 in 2006, which was 52 vessels (13%) less than that in 2005. For the purse seine vessels, the number of vessels over 200 GRT, which operated in the equatorial waters, was 35 in 2006, which was equivalent to that in 2005. The number of the purse seine vessels of 50-200 GRT, which operate to catch tunas in north of 20°N, was 84 in 2006, which are 3 vessels less than that in 2005. The total WCP-CA catch of tunas (Pacific bluefin, albacore, bigeye, yellowfin and skipjack) by the Japanese fishery in 2006 was 460,000 mt, corresponding to 92% of 501,000 mt in 2005. In 2006, the catch of tunas by the purse seine fishery was 257,000 mt (56% of the total catch of tunas), with 124,000 mt (27%) by the pole-and-line, 67,000 mt (15%) by the longline, and the remaining (2%) by the other gears.

Japan conducted several research activities in relation to tuna in the WCP-CA in 2007 and 2008, such as tagging study for tropical tunas and sharks, research cruise for collecting tuna larvae. In addition, experimental longline cruises were conducted in order to evaluate the effectiveness of circle hook in reducing hooking mortality of sea turtles, experiments on tori line, and sea turtle nesting survey.

1. Introduction

This paper describes recent trends in the Japanese tuna and billfish fishing activities by longline, pole-and-line, purse seine and the other fisheries mostly in the WCPFC Convention Area (WCP-CA), including fleet size, catch and fishing effort statistics. Purse seine catch statistics are updated to 2007 but it is not possible to provide 2007 statistics for longline and pole-and-line fisheries as the current level of logbook compilation is not yet enough to make the estimation for that year. Catch statistics of vessel smaller than 20 gross registered tonnages (GRT) for longline and pole-and-line are not compiled by the NRIFSF but referred to the publication of the Statistics Division of the Ministry of Agriculture, Forestry and Fisheries for 2003-2005 (MAFFJ 2005-2007), and presented in this paper. The catch statistics for 2006, which will be published as MAFFJ 2008 in near future, was derived from the Statistics Department, Ministry of Agriculture and Forestry. Furthermore, it is also shown that Research activities related to tuna and tuna-like species in the WCP-CA.

2. Trends in fleet size

Table 1 shows the number of Japanese tuna fishing vessels actually engaged in fishing by type of fishery and vessel size class during 2003-2007 (MAFFJ 2005-2007).

For the longline fishery, larger than 100 GRT vessels includes those operating out of the WCP-CA, but most of 100-199 GRT vessels are operating in this area, while most of the vessels larger than 200 GRT are operating outside of it. All other smaller size categories operate in the WCP-CA. The number of longline vessels of the largest size class (over 200 GRT), which experienced 20% reduction in 1999 as implemented with the agreement of the FAO's International Action Plan on management of fishing capacity, decreased remarkably from 490 in 2001 to 424 and 393 in 2005 and 2006, respectively. The total number of longline vessel in 2006 was 1,208 which are 25 vessels less than that of 2005.

In the case of pole-and-line vessel, number of vessels shows declining trend in most of vessel size category during the period 2003 to 2006. The number of vessels of largest size category (over 200 GRT) was 36 in 2006 corresponding to 80% of 45 in 2005. The decreasing rate in 2005 was relatively large. The numbers of small to medium-sized vessel categories, 10-50 GRT and 50-200 GRT were decreased 4% and 10%, respectively. Total number of pole-and-line vessels in 2006 was 335, which is 52 vessels (13%) less than that in 2005.

Purse seine vessels, which operate in the equatorial distant water of the western and central Pacific, are greater than 200 GRT (most of them are 349 GRT), and 50 - 200 GRT class vessels operate in coastal and offshore water of Japan north of 20˚N. The number of vessels of the latter size category engaged in tuna fishery, and has decreased from 92 in 2003 to 84 in 2007. The number of distant water purse seiner was 35 and showed no change after 1995.

3. Trends in catch and effort

The total WCP-CA catch of tunas (Pacific bluefin, albacore, bigeye, yellowfin and skipjack) by the Japanese fishery in 2006 was 459,631 mt corresponding to 92% of 501,094 mt in 2005. In 2006, the catch of tunas by the purse seine fishery was 257,363 mt (56% of the total catch of tunas), with 123,630 mt (27%) by the pole-and-line, 66,960 mt (15%) by the longline, and the remaining (2%) by the other gears.

3. 1. Longline fishery

Latest complete statistics are 2006 data for longline vessels larger than 20 GRT. Catch in weight of tunas (Pacific bluefin, albacore, yellowfin, and bigeye tunas), swordfish and billfishes (striped marlin, blue marlin, black marlin, sailfish and shortbill spearfish) caught by the Japanese offshore and distant water longline fishery in the WCP-CA from 2003 to 2007 are shown in Table 2 although the value of 2006 was overlaid for 2007 because the data coverage in 2007

is too low to estimate the reliable statistics of this year. Historical change in fishing effort and catch by species are shown in Fig. 1 and 2, respectively, for the years 1971-2006. Total longline fishing effort (in number of hooks) in all oceans which was 556 million hooks in 1981 decreased to 495 million in 1983 and increased again to 557 million in 1988 after when it has decreased steadily to less than 400 million since 1999. The ratio of effort deployed in the Pacific Ocean to all effort was about 70 % until the middle 1990s, has been decreased to about 50% in the latest decade. In the WCP-CA, around 60% of total Pacific effort has been deployed since the middle of 1980s. The fishing effort in the WCP-CA which was 105 million hooks in 2004, decreased to less than 100million, there after. In 2006, fishing effort deployed in the WCP-CA was 91 million hooks. Among the species caught, yellowfin catch was around 60 thousand mt at a peak during the late 1970s and the early 1980s and has since declined continuously to about 10 thousand mt in the recent years. Bigeye catch which had been relatively stable until 1992 with fluctuation between 30,000 and 50,000 mt, decreased suddenly to around 20,000 mt, thereafter. The billfish catch more or less reflected the decreasing trend in the fishing effort.

The quarterly effort distribution for longline vessels larger than 20 GRT of the average of 2005 and 2006 is shown in Fig. 3. The fishing grounds are located in east-west direction off Japan to Hawaii, equatorial area between 10˚S and 15˚N and off Australia. Distribution pattern of the effort does not show remarkable seasonal change, but in overall area, the fishing effort appeared to decrease in the second quarter than in the other quarters. Distribution of the catch by species for this fleet is shown in Fig. 4. They are classified into several clear patterns, swordfish targeting near Japan, albacore targeting in the middle latitudes between 15-30˚N and 25-40˚S, and tropical tuna (mostly bigeye) targeting in the equatorial waters.

Geographical distributions of fishing effort and catch composition for the coastal longliners (less than 20 GRT) were shown in Figs. 5 and 6. At the area between 130˚E and 140˚E and North of 15˚N, albacore is dominant in the catch while bigeye catch is dominant from 140˚E to 160˚E and from 30˚N to 40˚N. At the south of 15˚N, bigeye and yellowfin are major target species.

3. 2. Pole-and-line fishery

The catch and effort statistics in the WCP-CA by the Japanese pole-and-line fishery (larger than 20 GRT in vessel size) are shown in Table 3 from 2003 to 2007. In addition to this, historical change in catch by species and effort are shown in Fig. 7 for the period 1972-2007. Both the catch and effort gradually decreased throughout 1980s with a peak being around the late 1970s. After 1991 they were nearly stable. Total annual catches in 1970s and early 1980s ranged from 250,000 to 300,000 mt, and were around 150,000 mt in 1990s and later. Skipjack occupied the major part of catches being followed by albacore and yellowfin. Number of fishing days exceeded 60,000 days in 1970s but it is now slightly over 20,000 days. Number of poles used also peaked at 1977, and were more than 1,200,000 before 1982 except in 1972. Then, it decreased to 400,000 poles level during the 1990s and thereafter.

In 2006, the number of fishing days (including days of effort but no catch) was 16,770 days, declining (81%) from 2005, and the number of poles was 311 thousand poles, also declining (81%) from 2005. Total catch of major species (skipjack, bigeye, yellowfin, albacore and bluefin) in 2006 was 115,567 mt, corresponding to 77% of that in 2005 (Table 3). Catches of skipjack and albacore which are two major species caught by the pole-and-line fishery were 93,744 mt and 15,328 mt, respectively. While the skipjack catch considerably decreased (73%) from 128,703 mt in 2005, the albacore catch slightly decreases (95%) from 16,102 mt

Seasonal fishing ground of this fishery is shown as the quarterly distribution of fishing effort (the number of poles in 1x1 degree area) in average of 2005-2006 (Fig. 8). The fishing ground in the temperate waters (north of around 25˚N) moved from southwest of Japan toward northeast as time progresses. In addition to these fishing ground in temperate waters, north of the North Equatorial Current area was also important fishing ground for this fishery in 1st, 2nd, and 4th quarters of the year. In 2nd and 3rd quarters fishing grounds off northern Japan expanded to further east of 175˚E. There was no operation in the tropical waters south of 15˚N in the 3rd quarter.

Typical seasonal fishing ground by vessel type is as follows. The distant water vessels (larger than 300 GRT) fish skipjack in the tropical waters and the North Equatorial Current area from the late 4th quarter to the early 2nd quarter, and turn to north of around 35˚N, east of 150˚E where they target on albacore during June to October. In the case of

the offshore vessels (smaller than 300 GRT), this fleet primarily catch skipjack tuna. Its fishing starts at sub-tropical area east of Northern Mariana Islands in February. This fishing ground gradually moves northward, and then reaches area just nearshore of Japan, south and/or east of Tokyo in May and June. The fishing ground of this fleet moves further northward to off northern Japan 35˚N-42˚N, west of 155˚E, so-called Tohoku area. Other than these offshore vessels, some of small sized offshore vessels operate in the Nansei Islands, southwest of Japan, with anchored FADs almost all year around. The other smaller size vessels of the offshore vessel operate at the Izu Islands area, south of Tokyo, almost all year round.

In most of the fishing ground of pole-and-line fishery, skipjack dominated among species, except for at some part of waters off northern Japan, in which albacore dominated (Fig. 9). Most of yellowfin catch was made at the waters around Nansei Islands located in south Japan.

3. 3. Purse seine fishery

Total catch of the purse seine fishery has varied from 220,000 to 260,000 mt in recent five years. The majority of the catch has been skipjack which accounted for 80 % of the total catch in recent five years (Table 4 and Fig. 10). Annual total catch by species in 2007 obtained from the logbook in the WCP-CA by this fishery was 211,000 mt, 24,000 mt and 4,600 mt for skipjack, yellowfin and bigeye, respectively. About 157,000 mt of skipjack, 23,000 mt of yellowfin and 3,200 mt of bigeye were caught in the equatorial waters and the remaining was caught in the vicinity of Japan in 2007. The three species catch stabilized in recent three years (Table 4). Geographical distributions of catches for skipjack, yellowfin and bigeye are shown in Fig. 11. In most cases, skipjack was the largest portion of the catch among three species in each 1˚ x 1˚ block.

Fishing effort (fishing days including searching day) fluctuated between 7,500 to 9,500 days after the mid 1980s (Table 4 and Fig. 10).

In the tropical waters purse seine fishing grounds were formed widely between 10˚N, 130˚E and 10˚S, 180˚ (Fig. 12) with some seasonal fishing ground shift. In near shore Japan at Pacific side the fishing season targeted at skipjack started in April and continued until 3rd quarter.

This fishery utilizes tuna schools in association with natural log and FADs mainly in equatorial fishing grounds (Fig. 13). The operations for free swimming schools were found both in equatorial waters and in coastal waters of Japan.

3.4. Total catch for tropical tunas for all gears combined

Total catch for tropical tunas for all gears combined, including coastal fisheries (longline, pole-and-line, troll and other miscellaneous gears), are shown in Table 5 for 2003-2007. The data in 2007 is provisional. The catches in 2006 for bigeye, yellowfin and skipjack were 35,506 mt, 50,096 mt and 321,463 mt, respectively. Total catch of bigeye increased in 2006 (121%) from 29,303 mt in 2005 due to the increase by the both Distant water and Offshore and coastal longline catches. On the other hand total catch of skipjack decreased in 2006 (89%) from 362,610 mt in 2005 due to the decrease by the distant water and offshore pole-and-line catch. During 2003-2006, there was no apparent trend in each species.

4. Research activities related to tuna and tuna-like species in the WCPFC Convention Area

4. 1. Biological data

NRIFSF has collected size data (weight and/or length) of tunas and billfishes in major landing port of Japan. Following is a summary of size sampling, focusing on length measurements, carried out mainly in 2006 and 2007. Note that size measurement of tunas and billfishes has been carried out on board of research vessels and training vessels other than port sampling for commercial vessels and that sex-specific size sampling on board of commercial longline vessels for billfishes in the North Pacific was started from 2003.

Size sampling

Length data of tunas and billfishes caught mainly near offshore of Japan have been collected in major landing ports of Japan. The major fishing gears, whose catches were measured are longline, pole-and-line, trolling and offshore purse seine. In 2006, the number of length data collected for bluefin, albacore, and skipjack were 99,000, 124,000 and 79,000, respectively. Length data for tropical tunas as bigeye and yellowfin has been collected in Kesennuma (North part of Japan) and Kii-Katsuura (South part of Japan) ports since 2005. In 2007, about 6,000 bigeye and 7,000 yellowfin were measured at the Kii-Katsuura port.

Length sampling for distant water purse seiner

In addition to the size sampling mentioned above, port sampling program have been conducted to collect length data for skipjack, yellowfin and bigeye caught by distant water purse seine fishery in Yaizu and Makurazaki ports located at central and south of Japan, respectively. We performed the port sampling 20 times in a year in Yaizu port and six times at Makurazaki port. Annual total measurement number in 2007 was 28,700 fishes 7,800 and 2500 for skipjack, yellowfin and bigeye, respectively. For all three species, the majority of the catch was small fish less than about 80 cm in fork length in 2007 (Fig. 14) and there were three or four modes.

Observer program

Two observer programs have conducted in the WCP-CA, and these are for purse seine and longline.

The observer program for purse seine has been implemented in the tropical Pacific Ocean since 1995. The detail of time and position of operations, floating objects and the length frequencies of the catch in each operation were investigated. The total number of cruises of this program is 35 for 13 years until 2007 (Table 6).

The observer program for longline was also conducted in the WCP-CA in 2008. The information of fishing boat, operations and the data of all animals caught in each operation were collected. To date, one cruise was completed during January and February in 2008 and fourteen operations were observed. Other two or three cruises are planned during 2008.

4. 2. Tagging

Tropical tuna tagging project in Japan

Tagging project on bigeye and yellowfin was started in 1999 in southern Japan, and is being continued. Major objectives of this project are to investigate movements of fish in this area in relation to the surrounding waters, detailed movements around the anchored FADs, information on growth, the degree of exploitation by fishing gear in the area and so on. To date, nearly 2,232 bigeye and 10,276 yellowfin of 24-83cm in fork length were released with dart tag, of which 249 bigeye and 797 yellowfin tunas were recaptured (Table 7). After released from the waters around Okinawa and Amami Islands (24-30˚N, 123-132˚E), some individuals remained around the released area and the majority of others showed northeastern movement to east of Honshu along the Kuroshio Current. At the same time, archival tagging was also conducted for both species. Although the days at liberty of most recaptures are short, interesting results on the swimming behavior of these species are being gathered. As the information of movement after they reach east of Honshu is very rare, tagging on bigeye and yellowfin tuna caught by pole and line fishing east off Japan has been tried since 2006. This year, practical tagging research using pole and line gear has been conducted by a prefectural research vessel “Shin Miyagi-Maru” and staff of NRIFSF (National Research Institute of Far Seas Fisheries) from 24th June to 13th July aiming at tagging on small to medium size (40-80cm) of bigeye tuna. A total of 1000 fish (mostly bigeye tuna) were tagged and released. Detail of this study is reported by Matsumoto and Okamoto (2008).

Skipjack tagging

Five research/training pole-and-line vessels were involved in the skipjack tagging in 2006. The tagging was made widely in north of equator in the Western Pacific ranged from 5˚N to 37˚N, from 137˚E to 150˚E. Total of 1,444 skipjack were released in 2006 and 149 skipjack were recovered to date. Most recapture was made in third quarter and more than 90% of skipjack was recaptured within 60 days.

Shark tagging

Shark tagging program has been conducted since 1996 to examine migration, population structure and life history parameters of pelagic sharks. In 2006, tags were attached to 1521 blue sharks, 32 bigeye threshers, 18 shortfin makos, one salmon shark, one oceanic whitetip shark and 5 longfin mako. Thirty one tags attached to blue sharks, 2 to shortfin mako and one to bigeye thresher were recovered and the tag recovery data indicated seasonal latitudinal migration of blue shark.

4. 3. Research cruise conducted

Tuna larva sampling by Shunyo-Maru

Tuna larva sampling was conducted by R/V Shunyo-Maru in the Pacific bluefin tuna spawning area during May 2007. The research cruises continued every year since 2004. A larva net which has 2 m diameter with 0.335 mm mesh size was used. Two patches of bluefin tuna larvae were found and tracked for two days with a drifter which was composed of GPS radio buoy and an 8 m drogue. Another research cruise targeting for the larva and juvenile was carried out from June to July in the spawning area. A 2 m diameter larva net and a pelagic trawl net which has 25 m diameter were used at 21 sampling stations.

4. 4. Bycatch species related research

Mitigation studies

Seabirds avoidance effects of two types of tori-lines specified in WCPFC seabirds conservation and management measure, “1a) Tori line” and “1b) Tori line (light streamer)”, were directly compared in longline fishing experiments in the western North Pacific, January – June, 2008, using three vessels, the C/V Kinei-maru No. 18 (19 GRT), the C/V Taiho-maru No. 68 (75 GRT) and the R/V Taikei-maru No. 2 (196 GRT). Results of the experiments indicated both types of tori-lines had satisfactory seabirds avoidance performance. Moreover the results suggested “1b) Tori line (light streamer)” had better performance in seabirds avoidance and practical utility compared to “1a) Tori line”; the light streamer type had many tangle-free streamers and had larger aerial coverage due to its light-weight structure.

Weighting method of branch lines have been developed and modified to attain sufficient sinking rates and safety and practical utility in fishing operation. Preliminary analysis of the experiment indicated that use of some types of lead core lines in the “sekiyama” part (above the leader) with a short leader provided a sinking rate equivalent to the rate recorded by those weighted branch lines specified in the WCPFC seabirds conservation and management measure [e.g., combination of 2 m leader and 6 m lead core nylon code (240 g), or 0.4 m lead core braided nylon monofilament (60 g)].

Experiments of large circle hooks (Mutsu improved type 1, 5.2-sun) and hook with tetra-pins on catch rates of target species and sea turtles are on the way through scientific fishing surveys in the western North Pacific from June to July 2008, using R/V Taikei-maru No. 2 (196 GRT). It is desirable to conduct further study on the effectiveness of various types of hooks.

In general, replacement of squid bait by fish bait is known to reduce the hooking rates of sea turtles. Fishing efficiency of the mackerel bait was compared to squid bait in deep-setting longline fishing operations in the central Pacific from April to July 2007, using a training vessel Shonan-maru (646 GRT). The results showed that the catch rates of bigeye tuna and the other fish species did not differ significantly between the two bait species.

Stock assessment of pelagic sharks

Short-term trend in standardized CPUE of shortfin mako was analyzed using the data collected by Japanese research and training vessels in the North Pacific from 1992 to 2005. Although there were some fluctuations in standardized CPUEs of this shark, no constant trend of increase or decrease was observed during this study period. Long-term trend in standardized CPUE of blue shark was analyzed using the logbook data from Japanese tuna long line

fisheries in the Pacific Ocean from 1971 to 2006. In North Pacific, increasing trend was observed from 1990 to 2004. In South, there was a slightly decreasing trend from 1998 to 2002, but after then recovery was observed.

Outreach and educational activities

The Organization for the Promotion of Responsible Tuna Fisheries (OPRT) is implementing a grant program for distributing circle hooks and de-hookers to Japanese fishermen. The Global Gurdian Trusts (GGT) is implementing a program for distributing free light type of tori lines to Japanese fishermen.

References

MAFFJ 2005-2007. Annual report of catch statistics on fishery and aquaculture, 2003-2005. Statistics Department, Ministry of Agriculture and Forestry.

Matsumoto, T. and H. Okamoto 2008. Overview of Japanese tagging project on tropical tunas in the temperate area of Japanese water. WCPFC-SC4 BI-WP-5. 8pp.

Table 1. Number of fishing vessels engaged in tuna fisheries in WCPFC Convention Area by gear and size of vessel. Figures in parentheses indicate provisional data.

Longline*

	2003	2004	2005	2006	2007
0-10 ton	326	287	292	311	(311)
10-50 ton	441	417	404	399	(399)
50-200 ton	163	132	105	97	(97)
200-500 ton	453	448	424	393	(393)
500+ ton	7	7	8	8	(8)

Pole-and-line

	2003	2004	2005	2006	2007
0-10 ton	215	208	180	149	(149)
10-50 ton	78	77	68	65	(65)
50-200 ton	100	95	94	85	(85)
200-500 ton	44	43	45	36	(36)

Purse Seine

	2003	2004	2005	2006	2007
50-200 ton	92	91	87	84	(84)
200-500 ton	34	34	34	34	(34)
500-1000 ton	1	1	1	1	(1)

* Boats larger than 50 GRT include those operated in the area other than the Pacific.

Table 2. Fishing effort (in million hooks) and catch (mt) in the WCPFC Convention Area by species for the Japanese longline fishery (boats larger than 20 GRT). Figures in parentheses indicate provisional data.

	2003	2004	2005	2006	2007
Number of hooks	112	106	92	91	(91)
Pacific bluefin	95	238	123	82	(82)
Albacore	7,010	7,944	9,175	7,931	(7,931)
Bigeye	17,708	20,725	13,951	15,146	(15,146)
Yellowfin	10,418	9,441	9,178	10,097	(10,097)
Swordfish	5,224	5,566	5,419	6,222	(6,222)
Striped marlin	979	688	463	485	(485)
Blue marlin	1,726	1,949	1,738	1,717	(1,717)
Black marlin	41	55	65	75	(75)
Sailfish	71	41	102	111	(111)
Shortbill spearfish	51	55	67	127	(127)
Total	43,228	46,463	40,157	41,910	(41,910)

Table 3. Days fished, number of poles used, and catch (mt) by species for the Japanese pole-and-line fishery (larger than 20GRT) in the WCPFC Convention Area. Figures in parentheses indicate provisional data.

	2003	2004	2005	2006	2007
Number of fishing day	20,772	20,420	20,643	16,770	(16,770)
Number of pole	393,099	386,899	385,525	310,725	(310,725)
Skipjack	115,765	98,138	128,703	93,744	(93,744)
Yellowfin	2,089	2,285	3,140	2,690	(2,690)
Bigeye	822	3,341	1,283	3,745	(3,745)
Albacore	36,046	32,190	16,102	15,328	(38,211)
Pacific bluefin	9	9	177	61	(2)
Total	154,730	135,962	149,405	115,567	(144,012)

Table 4. Fishing days including searching days and catch (mt) by species for the Japanese tuna purse seine fishery in the WCPFC Convention Area based on logbook data.

	2003	2004	2005	2006	2007
Number of fishing day	8,663	8,822	8,651	7,870	7,635
Skipjack	187,443	172,619	218,498	216,408	215,310
Yellowfin	27,195	22,628	26,270	28,183	24,390
Bigeye	5,099	4,577	4,696	4,608	4,883
Pacific bluefin	945	4,792	3,871	3,889	2,943
Albacore	612	7,182	844	336	5,166
Total	221,293	211,798	254,180	253,424	252,719

Table 5. Japanese catches for tropical tuna species by gear. Figures in parentheses indicate provisional data. LL: longline, PL: pole-and-line, PS: purse seine. Figures in parentheses indicate provisional data.

		2003	2004	2005	2006	2007
Bigeye	Total	32,209	37,333	29,301	35,506	(35,781)
	Distant water and Offshore LL	17,708	20,725	13,951	15,146	(15,146)
	Distant water and Offshore PL	822	3,341	1,283	3,745	(3,745)
	Tuna PS	5,099	4,577	4,696	4,608	4,883
	Coastal LL	8,402	8,523	9,069	11,730	(11,730)
	Coastal PL	35	52	51	75	(75)
	Coastal PS	1	6	10	52	(52)
	Gill net	11	5	6	11	(11)
	Troll	105	83	135	101	(101)
	Set net	1	2	4	0	(0)
	Unclassified	24	19	96	39	(39)
Yellowfin	Total	50,017	43,479	47,325	50,096	(46,303)
	Distant water and Offshore LL	10,418	9,441	9,178	10,097	(10,097)
	Distant water and Offshore PL	2,089	2,285	3,140	2,690	(2,690)
	Tuna PS	27,195	22,628	26,270	28,183	24,390
	Coastal LL	6,385	5,768	5,645	4,898	(4,898)
	Coastal PL	779	755	507	1,650	(1,650)
	Coastal PS	86	8	153	23	(23)
	Gill net	22	10	13	13	(13)
	Troll	2,683	2,294	2,094	2,262	(2,262)
	Set net	31	25	30	18	(18)
	Unclassified	329	265	295	263	(263)
Skipjack	Total	325,281	297,592	362,610	321,463	(320,365)
	Distant water and Offshore LL	67	51	74	70	(70)
	Distant water and Offshore PL	115,765	98,138	128,703	93,744	(93,744)
	Tuna PS	187,443	172,619	218,498	216,408	215,310
	Coastal LL	42	21	27	13	(13)
	Coastal PL	9,377	9,990	7,363	6,213	(6,213)
	Coastal PS	1,632	716	296	564	(564)
	Gill net	711	721	707	311	(311)
	Troll	9,386	14,802	5,971	3,624	(3,624)
	Set net	399	224	711	330	(330)
	Unclassified	459	311	260	186	(186)

Table 6. Number of cruise for the purse seine observer program in the tropical waters of the west central Pacific .

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Number of cruise	2	4	3	4	3	3	3	3	3	1	1	2	3	35

Table 7. Number of fish released and recaptured in the tropical tuna tagging project conducted in the Nansei Islands area (Okinawa and Amami Islands).

Dart tag

Species	**Bigeye tuna**			**Yellowfin tuna**			**Total**		
Year	Release	Recapture	% of	Release	Recapture	% of	Release	Recapture	% of
2000	442	99	22.4%	1174	164	14.0%	1616	263	16.3%
2001	374	37	9.9%	1435	90	6.3%	1809	127	7.0%
2002	170	15	8.8%	970	53	5.5%	1140	68	6.0%
2003	365	40	11.0%	1580	240	15.2%	1945	280	14.4%
2004	188	14	7.4%	1463	86	5.9%	1651	100	6.1%
2005	265	18	6.8%	1354	83	6.1%	1619	101	6.2%
2006	279	7	2.5%	1179	38	3.2%	1458	45	3.1%
2007	149	19	12.8%	1121	43	3.8%	1270	62	4.9%
Total	2232	249	11.2%	10276	797	7.8%	12508	1046	8.4%

Archival tag

Species	**Bigeye tuna**			**Yellowfin tuna**			**Total**		
Year	Release	Recapture	% of	Release	Recapture	% of	Release	Recapture	% of
2000	20	6	30.0%	13	0	0.0%	33	6	18.2%
2001	16	1	6.3%	24	2	8.3%	40	3	7.5%
2002	19	4	21.1%	10	1	10.0%	29	5	17.2%
2003	7	2	28.6%	19	1	5.3%	26	3	11.5%
2004	9	0	0.0%	10	1	10.0%	19	1	5.3%
2005	21	7	33.3%	3	0	0.0%	24	7	29.2%
2006	13	1	7.7%	1	0	0.0%	14	1	7.1%
2007	20	2	10.0%	0	0	-	20	2	10.0%
Total	125	23	18.4%	80	5	6.3%	205	28	13.7%

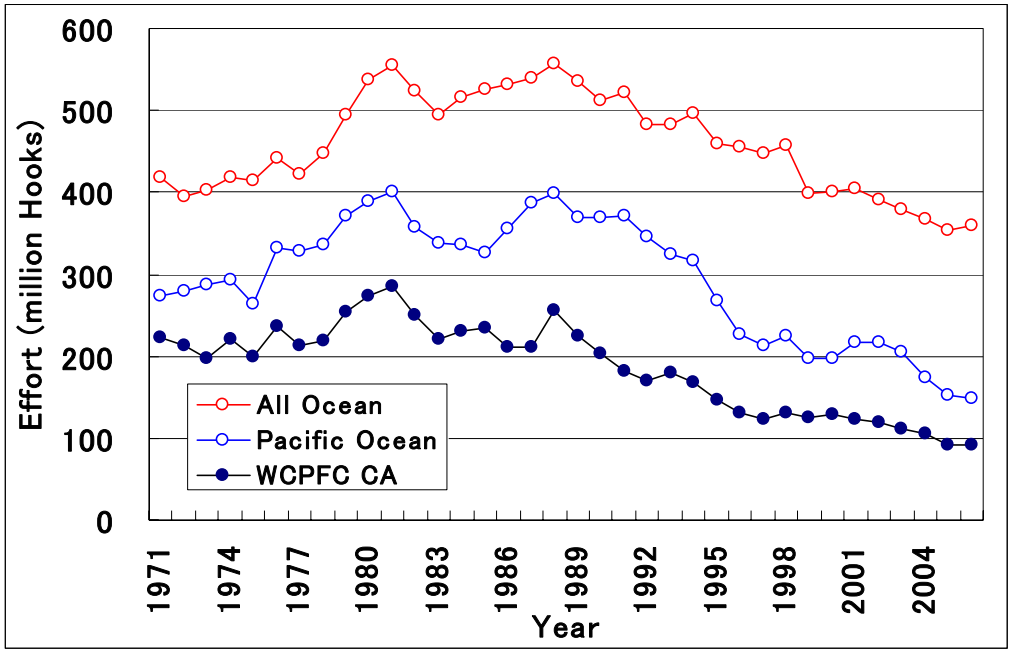

Fig. 1. Historical change in fishing effort of the Japanese longline fishery (>20GRT) in the WCPFC Convention Area.

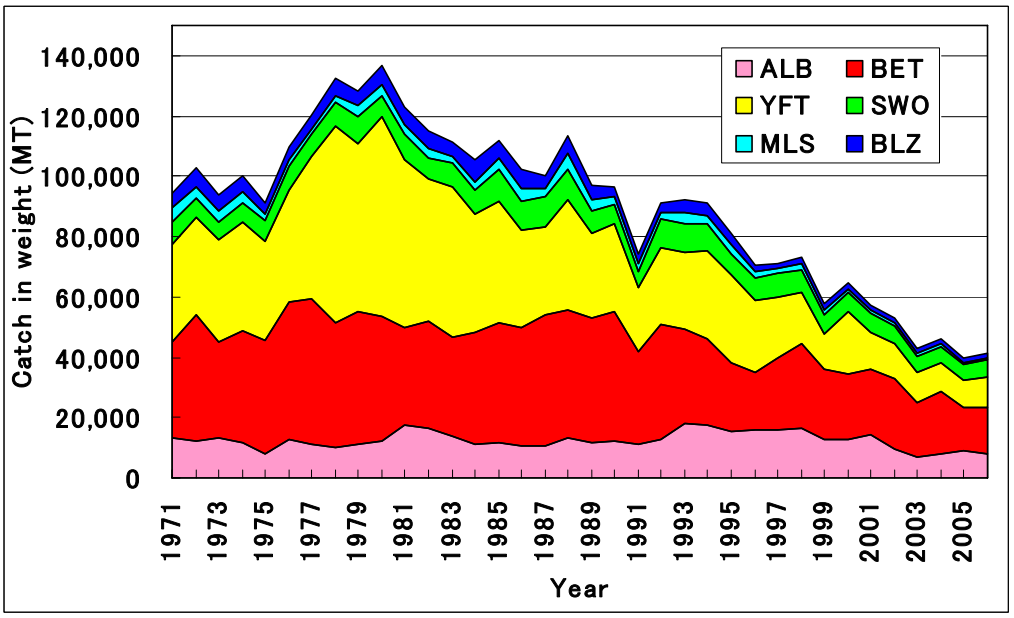

Fig. 2. Historical change of catches of major species for the Japanese longline fishery (>20GRT) in the WCPFC Convention Area.

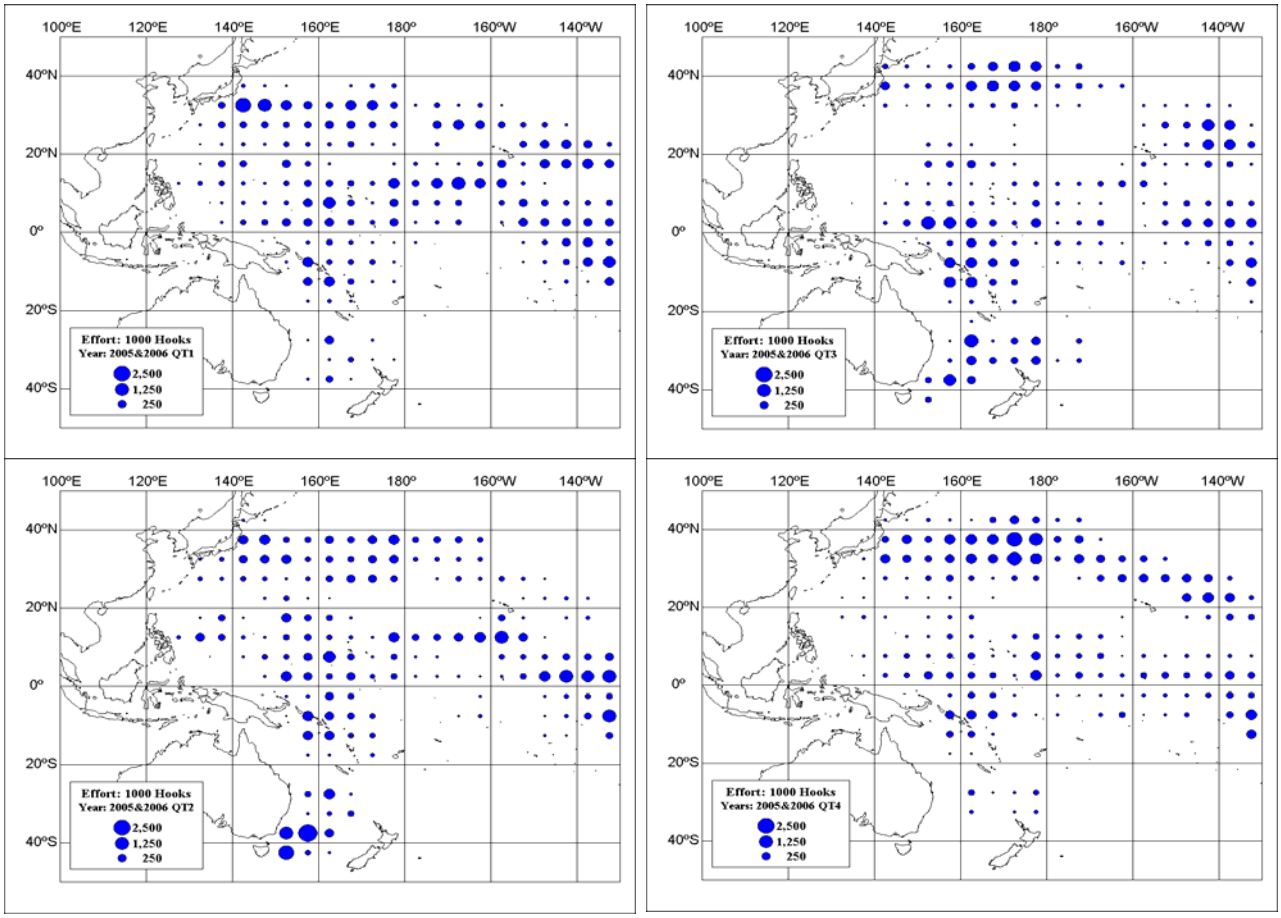

Fig. 3. Quarterly distribution of fishing effort for the Japanese offshore and distant water longline fisheries in the western and central Pacific Ocean in average of 2005-2006.

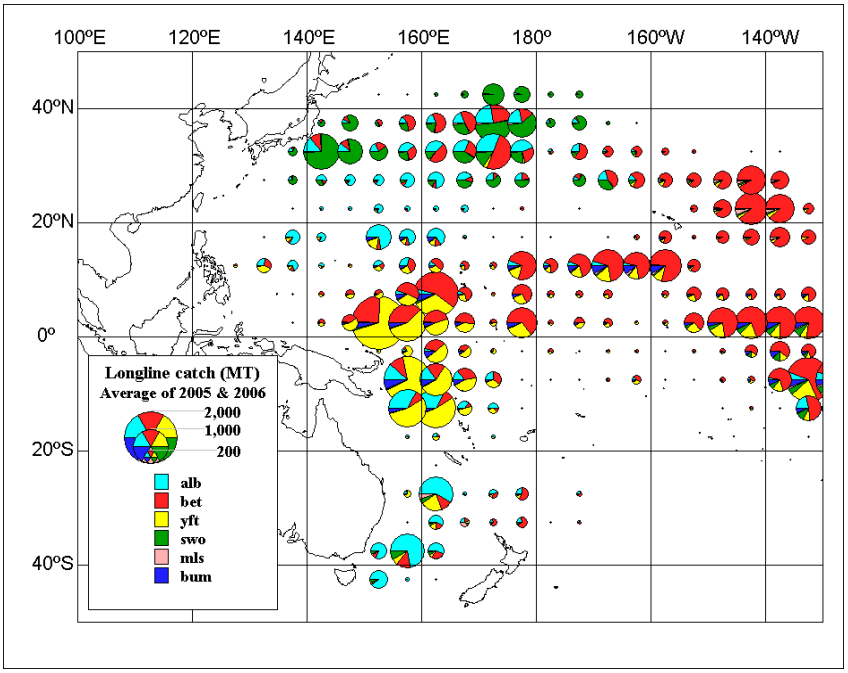

Fig. 4. Distributions of offshore and distant water longline catch (weight) by species in average of 2005-2006 for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BLZ: blue marlin).

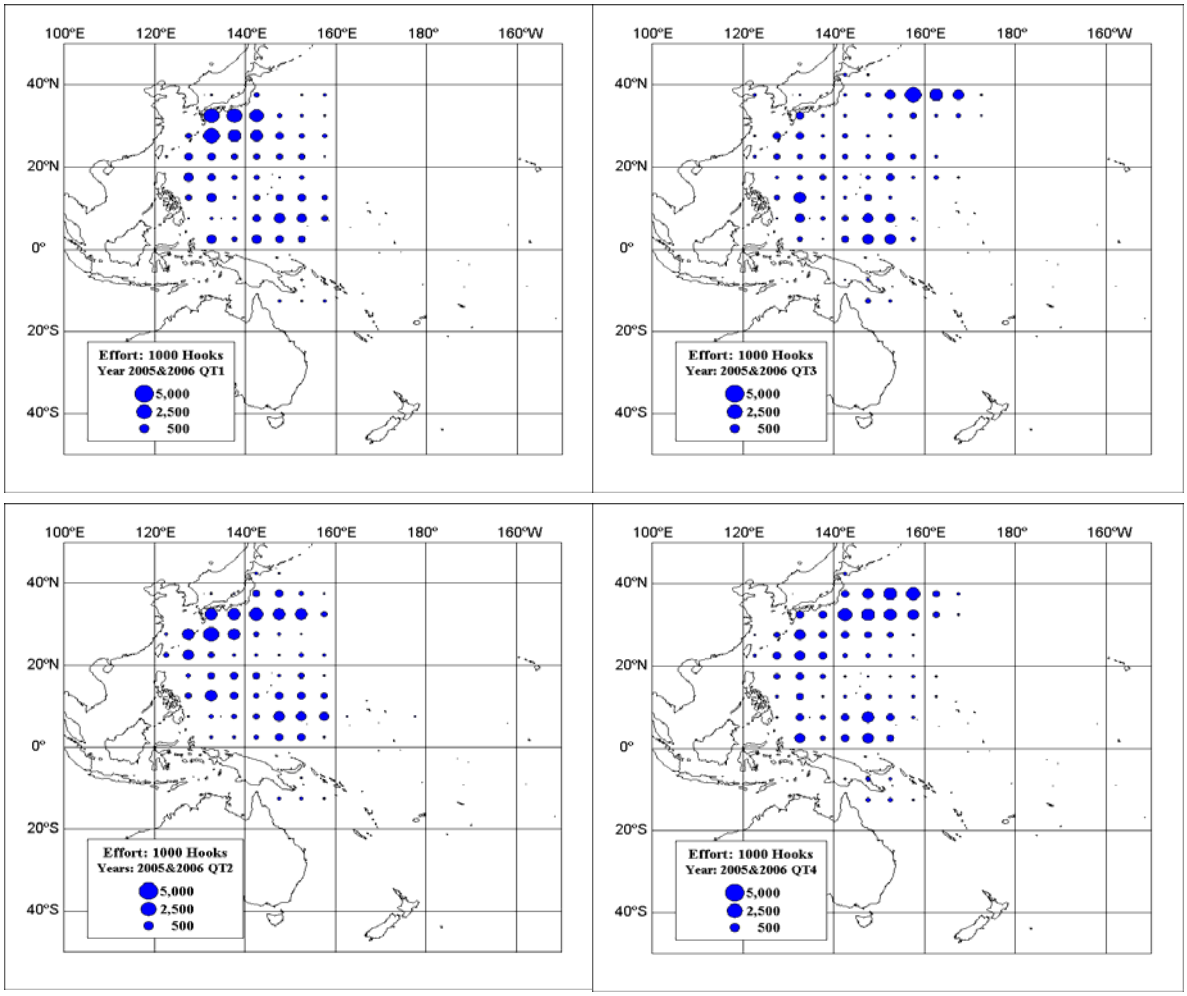

Fig. 5. Quarterly distribution of fishing effort for the Japanese coastal longline fisheries (less than 20 GRT) in the western and central Pacific Ocean in average of 2005-2006.

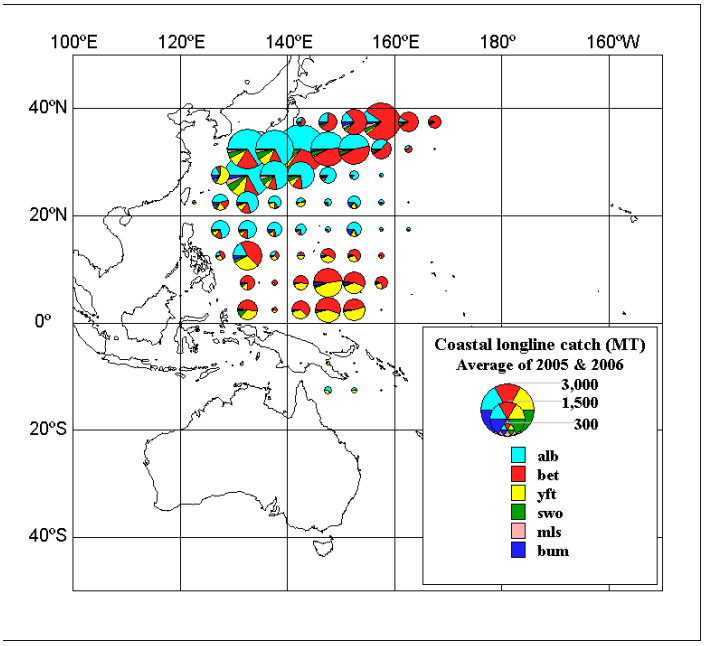

Fig. 6. Distributions of coastal longline catch (weight) by species in average of 2005-2006 for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BLZ: blue marlin).

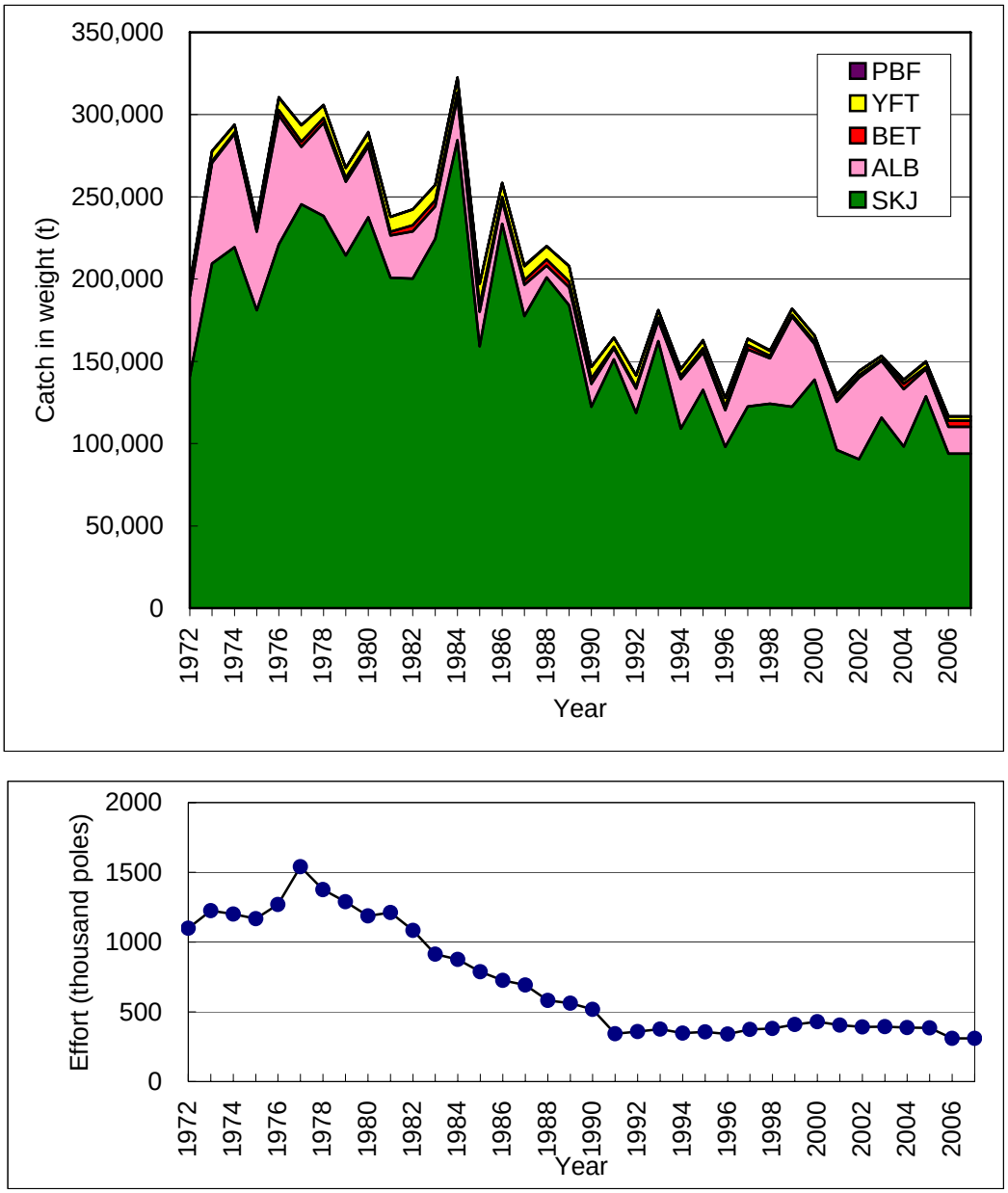

Fig. 7. Historical change of fishing effort and catches by species for the Japanese pole-and-line fishery (>20GRT) in the WCPFC Convention Area. Value in 2007 is provisional.

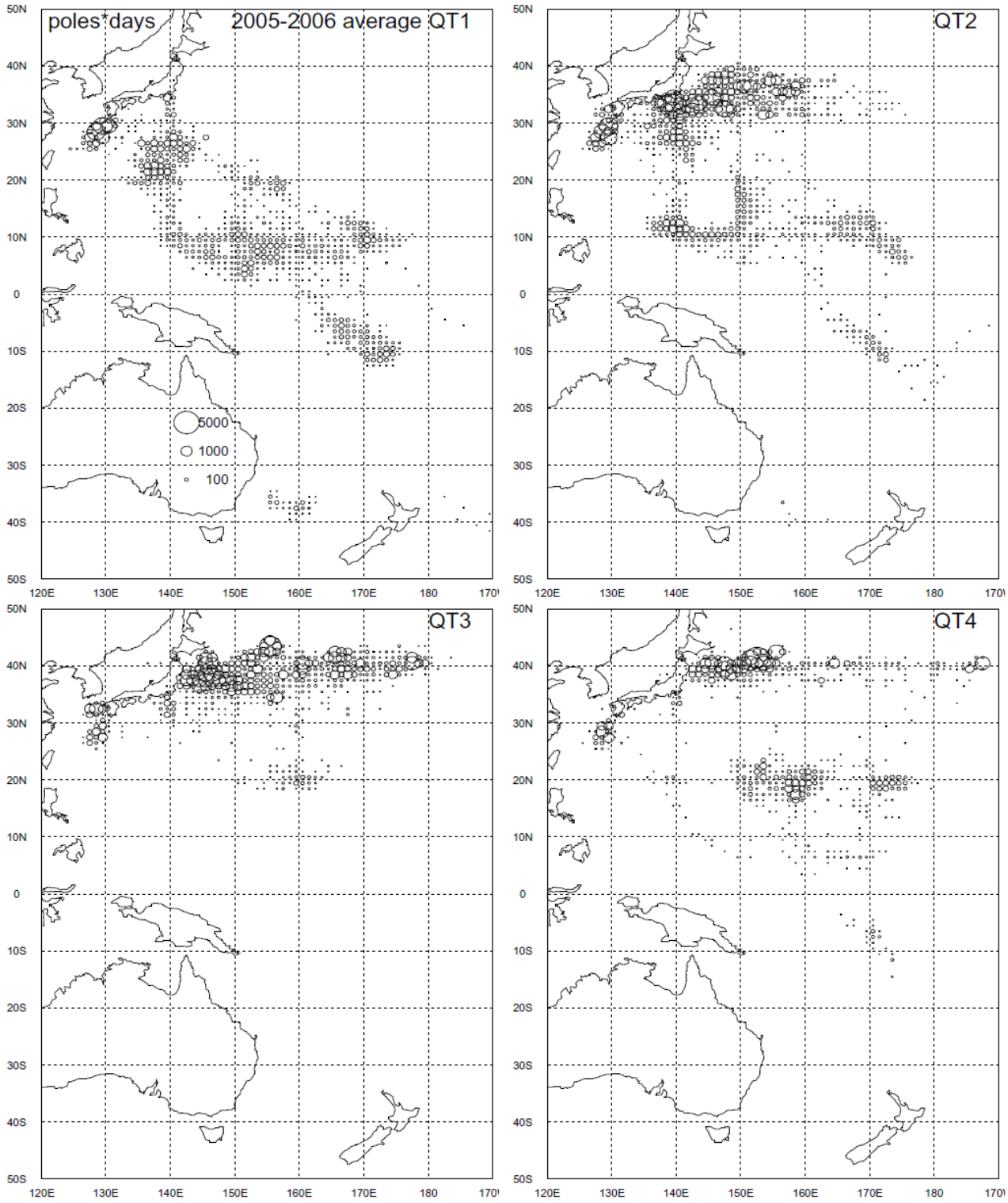

Fig. 8. Quarterly distribution of fishing effort for the Japanese pole-and-line fishery (offshore and distant water licenses) in the Pacific Ocean in average of 2005-2006.

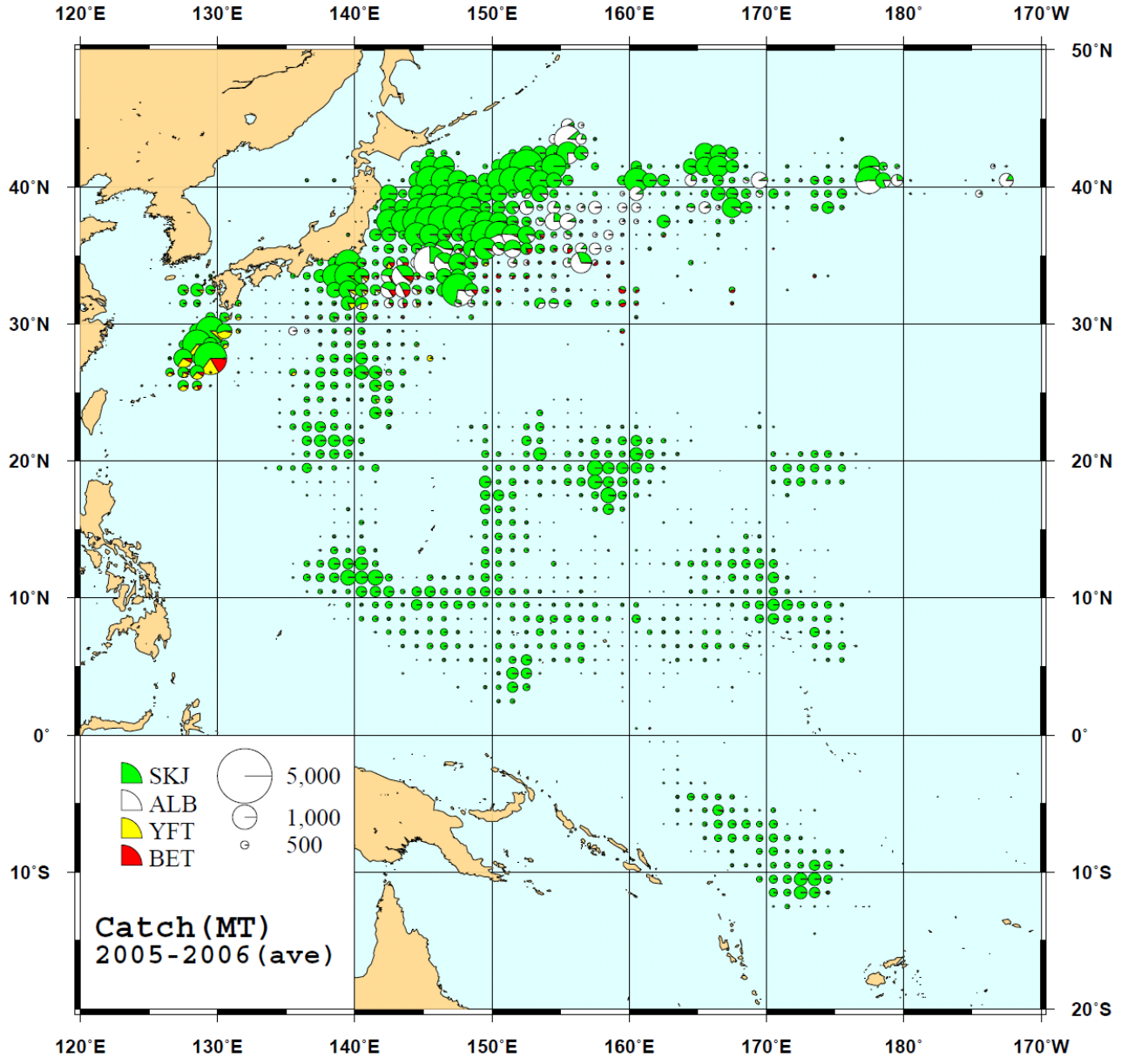

Fig. 9. Distribution of catch and its species composition for the Japanese offshore and distant water pole-and-line fishery in average of 2005-2006.

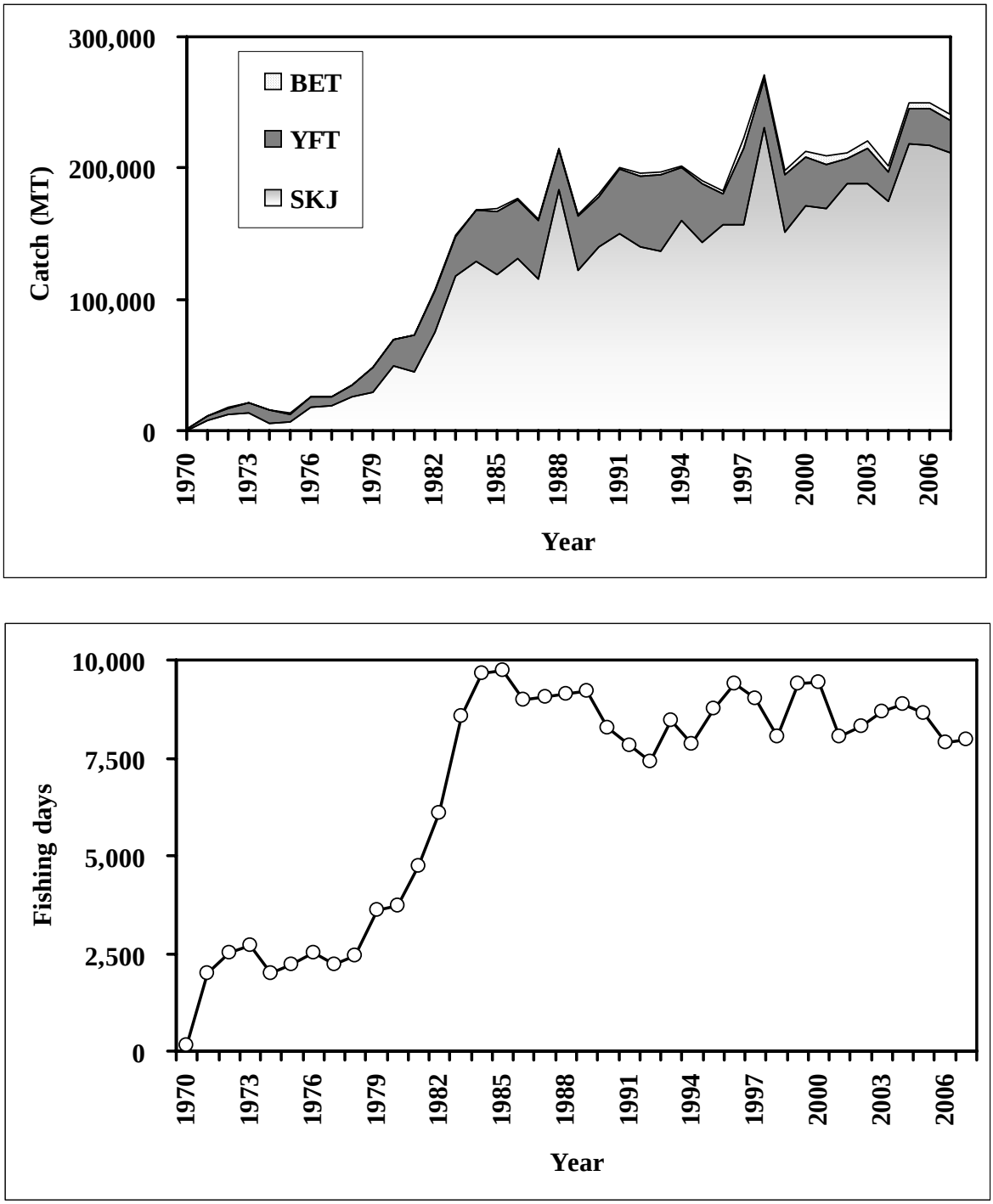

Fig. 10. Trends of fishing effort and catches by species for the Japanese tuna purse seine fishery in the WCPFC Convention Area.

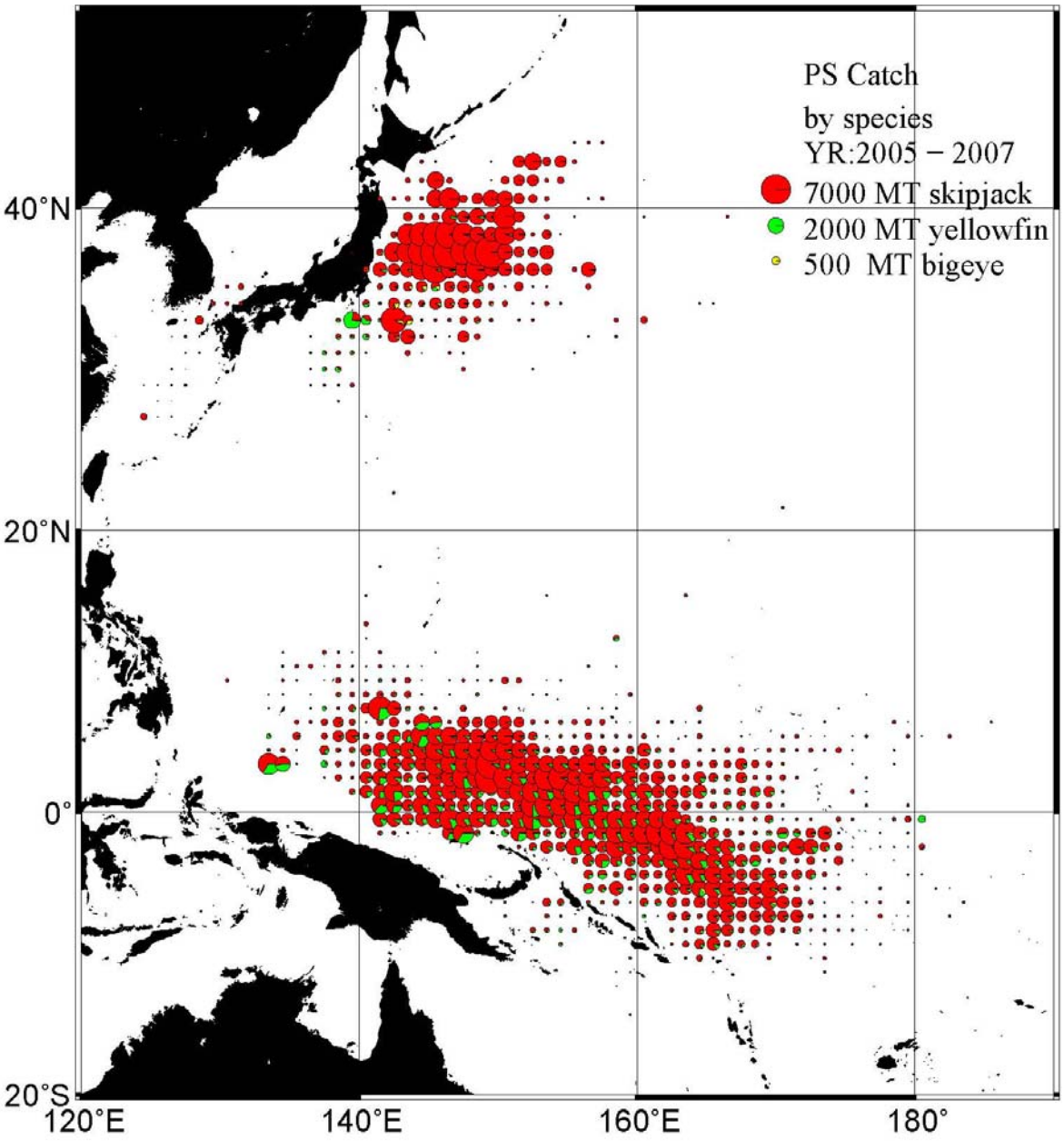

Fig. 11. Distribution of tuna purse seine catch (mt) by species for tropical tuna species (bigeye, yellowfin and skipjack) combined for 2005- 2007.

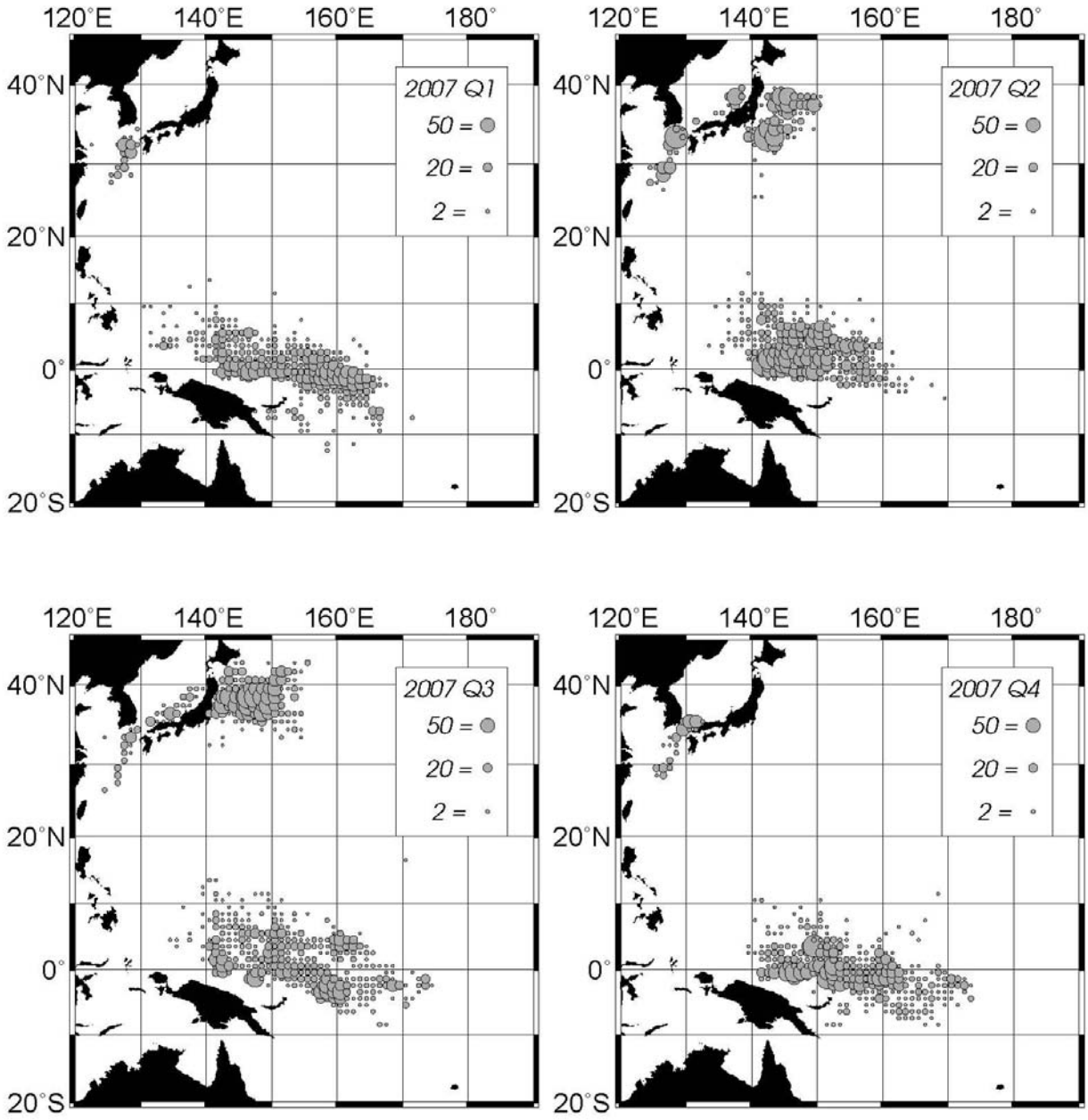

Fig. 12. Quarterly distributions of fishing effort (fishing days including searching days) for the Japanese tuna purse seine fishery in the Pacific Ocean in 2007.

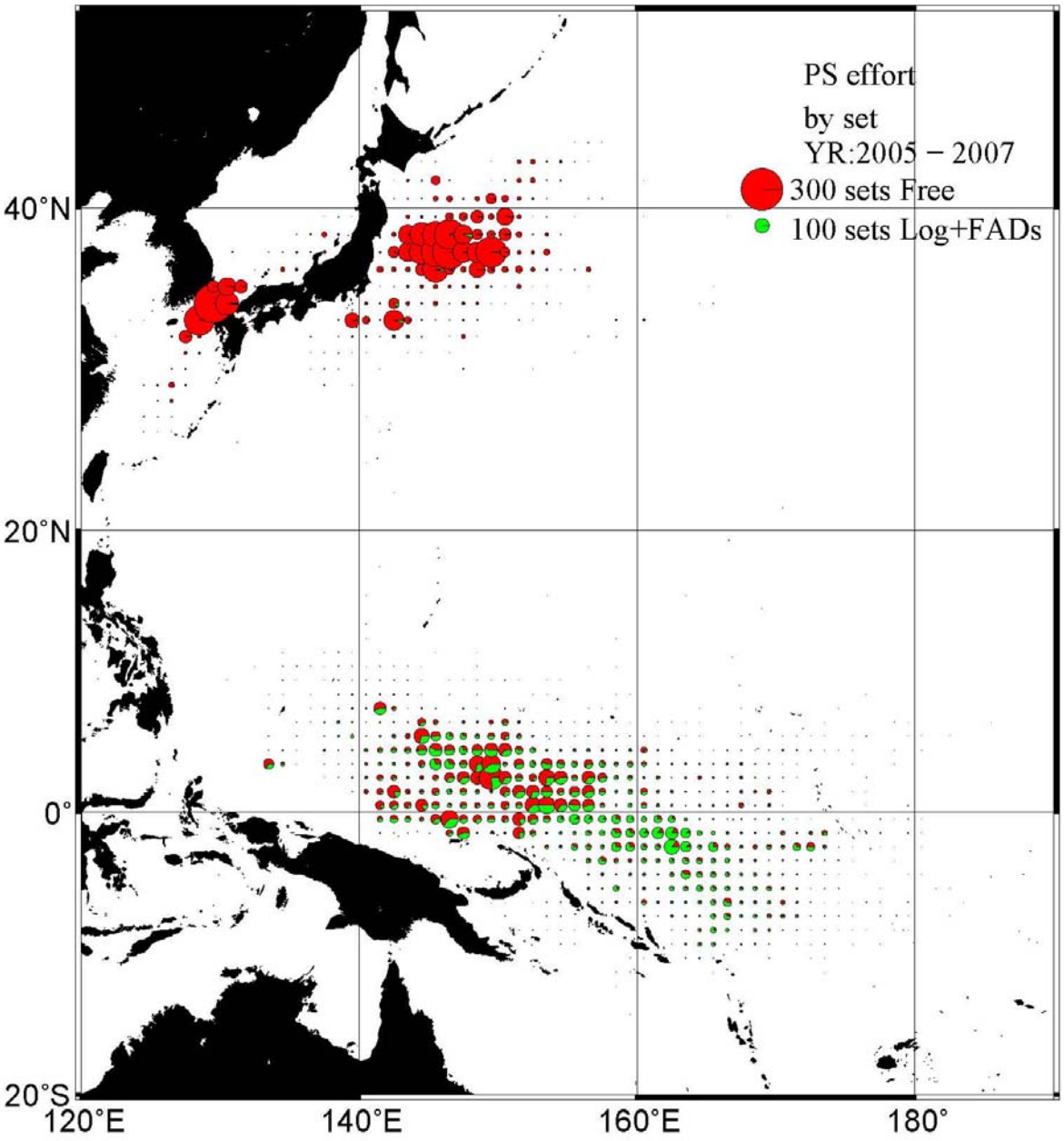

Fig. 13. Distribution of sets by type of school for 2005-2007 deployed by the tuna purse seine fishery by Japan.

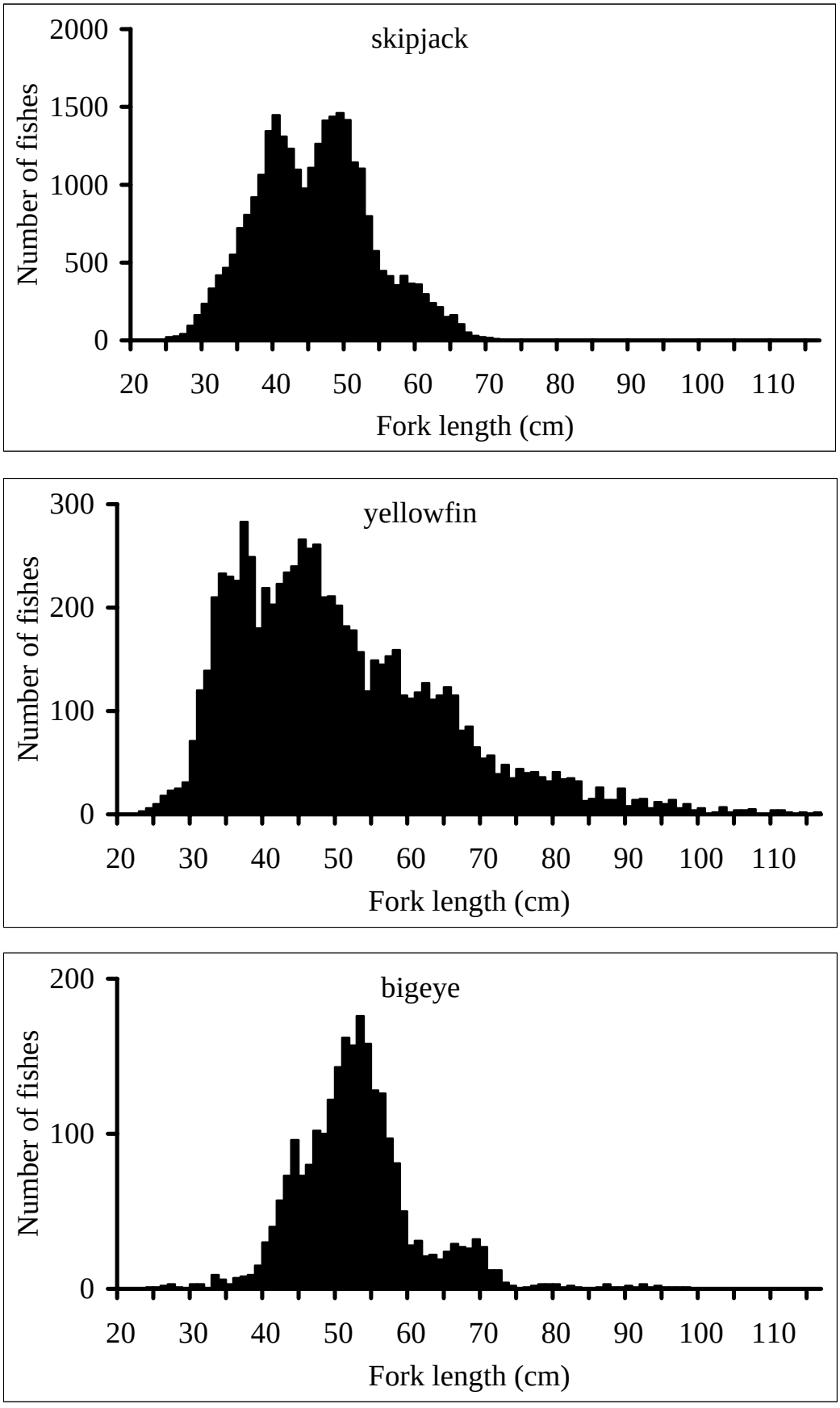

Fig. 14. Annual length frequency distribution of purse seine-caught fish in equatorial waters in 2007.