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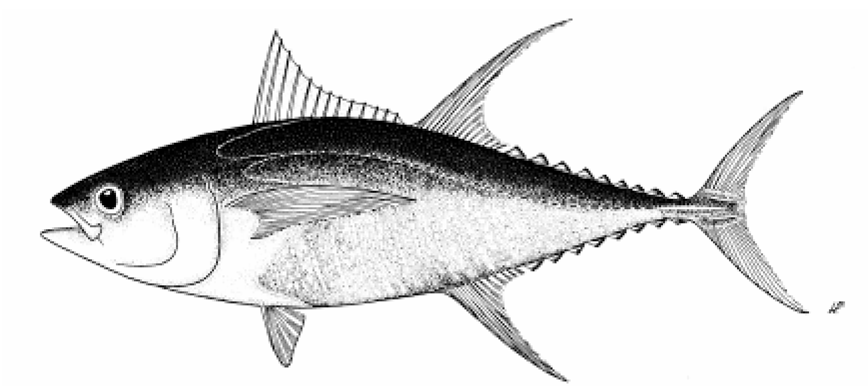
National tuna fisheries report of Japan as of 2005



Uosaki, K., Okamoto, H. and Nishikawa, Y.

National Research Institute of Far Seas Fisheries. Shimizu, Japan.

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National Tuna Fisheries Report of Japan as of 2005

Uosaki K., H. Okamoto,
S. Sato, and N. Miyabe

Fisheries Research Agency
National Research Institute of Far Seas Fisheries (NRIFSF)
5 Chome 7-1, Orido, Shimizu-ku, Shizuoka 424-8633, Japan

1. Introduction

This paper describes recent trends in the Japanese tuna fishing activities (longline, pole-and-line and purse seine) mostly in the WCPFC Convention Area (WCPFC CA). Fleet, fishing effort and catch statistics are included. Purse seine catch statistics are updated to 2004 but it is not possible to provide them 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 boat smaller than 20 gross tonnages (GRT) for longline and pole-and-line, which is not covered by the current logbook system (pole-and-line, troll, etc) or insufficient to do so (longline), are not compiled by the NRIFSF but referred to the publication of the Statistical Division of the Ministry of Agriculture, Forestry and Fisheries (MAFFJ 2000-2002), and presented in this paper.

2. Trends in fleet size

Table 1 shows the number of Japanese tuna boats actually engaged in fishing by type of fishery and vessel size class during 2000-2004 (MAFFJ 2000-2002).

For the longline fishery, larger than 100 GRT vessels includes those operating out of the WCPFC CA, but almost of 100-199 GRT boats are operating in the WCPFC CA, while most of the boats larger than 200 GRT are operating at outside of it. All other categories operated in the WCPFC CA. The number of longline vessels of the largest size class (over 200 GRT), which experienced 20% reduction in 1999, was 484 in 2002. This reduction of vessel was implemented in accordance with the agreement at the FAO's International Action Plan on management of fishing capacity. The total number of longline vessels in 2002 was 1,447 which are 29 vessels less than that of 2001.

In the case of pole-and-line boat, the number of vessels of the largest size category (over 200 GRT) was 47 in 2000 and was 48 in 2002. The trend of number of vessels of this category was stable in recent years, lasting 10 years. On the contrary, the number of vessels of the other categories, namely 0-10 GRT, 10-50 GRT and 50-200 GRT classes decreased during 2000-2002. Among them, the number of vessel of the 0-10 GRT class sharply decreased from 265 in 2000, to 176 in 2002. The numbers of vessel of the categories 10-50 GRT and 50-200 GRT decreased from 93 to 76 and 113 to 103, respectively, during 2000-2002. Total number of pole-and-line vessels in 2002 was 403, which is 115 vessels or 22% less than that in 2000.

Purse seine vessels, which operate in the equatorial waters of the western and central Pacific, are greater than 200 GRT (most of them are 349 GRT), and 50-150 GRT class boats operate in near shore Japan north of 20˚N. The number of vessels of the latter size category engaged in tuna fishery has slightly decreased from 23 in 2000 to 18 in 2002. The number of equatorial waters purse seine was 36 and showed no change after 1995.

3. Trends in catch and effort

3. 1. Longline fishery

Latest available statistics are provisional 2004 data for longline boats larger than 20 GRT. Catch in weight of tunas (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 WCPFC CA from 2000 to 2004 are shown in Table 2. In Fig. 1, historical change in catch by species and effort are shown, respectively, for the years 1971-2004. Total longline fishing effort (in number of hooks) has decreased steadily since a peak in 1981. The fishing effort in 2004 was 118 million hooks which is 30 % lower than 10 years ago. Among the species caught, albacore and swordfish did not show any decline while the other species indicated continuous reduction especially after 1981. The yellowfin catch was at a peak during the late 1970s and the early 1980s and started going down soon after.

Bigeye catch followed this trend in more recent years beginning in the early 1990s. The billfish catch more or less reflected the decreasing trend in the fishing effort.

The quarterly effort distribution for boats larger than 20 GRT of the averaged for 2002 and 2003 is shown in Fig. 2. 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 patterns of the catch by species for this fleet are shown in Fig. 3, and they are classified into several clear patterns (swordfish targeting near Japan, albacore targeting in the middle latitudes between 10-30˚N 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. 4 and 5. 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 to160˚E and from 30˚N to 40˚N.

3. 2. Pole-and-line fishery

The catch and effort statistics in the WCPFC CA by the Japanese pole-and-line fishery (larger than 20 GRT in vessel size) are shown in Table 3 from 2000 to 2004. In addition this historical change in catch by species and effort are shown in Fig. 6, respectively, for the years 1972-2004. Catch and effort decreased gradually throughout 1980s with a peak being around the late 1970s. After 1991 they were almost stable. Total yearly catches in 1970s and early 1980s were 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 2003, the number of fishing days was 20,664 days, decreased slightly from 2002 and the number of pole was equivalent to 2002. Total catch in 2003 was higher than those in previous years amounting at 152,784 MT (Table 3). Catches of skipjack, yellowfin and bigeye tunas in 2003 were 115,257 MT, 2,089 MT and 822 MT, respectively. The skipjack catch increased to 115,257 t, 127% of that in 2002. On the other hand, the albacore, yellowfin and bigeye catches were lower than those in 2002.

Seasonal fishing grounds of this fishery are shown as the quarterly distribution of fishing effort (the number of poles in 1x1 degree area) in average of 2002-2003 (Fig. 7). The fishing grounds in the temperate waters (north of around 25˚N) moved from southwest of Japan toward northeast as the time progresses. In addition to these fishing grounds in temperate waters, north of the North Equatorial Current area was also important fishing ground for this fishery in 1st, 2nd, and 4th quarter of the year. In 2nd and 3rd quarter fishing grounds off northern Japan expanded to further east of 175˚E. There was no operation in the tropical waters south of 20˚N in the 3rd quarter.

Typical seasonal fishing ground by vessel type was as follows; The distant water vessels (larger than 300 GRT) fish in the tropical waters and the North Equatorial Current area from late 4th quarter to early 2nd quarter, and turn to far north to the area east of 150˚E where they target on albacore during June to October. In the case of the offshore vessels (smaller than 300 GRT), its fishing starts at sub-tropical area east of Northern Mariana Islands in February. This fishing ground gradually moves northward, and then reaches just nearshore area, 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 smaller size of the offshore vessels operate in the Nansei Islands, southwest of Japan, with anchored FADs almost all year around. The others of the smaller size of the offshore vessels operate at Izu Islands area, south of Tokyo, almost all year round.

Most of the fishing ground of pole-and-line fishery skipjack has been the major target species (Fig. 8). Most of albacore catch of this fishery is made at further northeastern area and most of yellowfin catch at the Nansei Islands area.

3. 3. Purse seine fishery

Total catch of the purse seine fishery has stabilized to nearly 200,000 MT in recent years. The majority of the catch has been skipjack which accounted for more than 74% of the total catch in recent years (Table 4 and Fig. 9). Annual total catch in 2004 obtained from the logbook in the WCPFC CA by this fishery was 174,000 MT, 22,000 MT and 4,500 MT for skipjack, yellowfin and bigeye, respectively. About 135,500 MT of skipjack, 20,000 MT of yellowfin and 3,500 MT of bigeye were caught in the equatorial waters and the remaining was caught in the vicinity of Japan in 2004. The skipjack catch was the same as the recent five years average while bigeye catch was about 91% of five years average (Table 4), and the yellowfin catch was lower than the recent average (81%). Geographical distributions of catches for skipjack, yellowfin and bigeye are shown in Fig. 10. 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 8,000 to 9,000 days after the mid 1980s (Table 4 and Fig. 9).

In the tropical waters purse seine fishing grounds were formed widely between 10˚N, 130˚E and 10˚S, 180˚ (Fig. 11) with some seasonal fishing ground shift. In near shore Japan at Pacific side the fishing season targeted at skipjack was started in April and maintained until November.

This fishery utilizes tuna schools in association with FADs mainly east of 155˚E (Fig. 12). The number of operations with FADs was large in 2000 and 2001, but decreased after 2002. Traditional operations with natural logs increased and were observed in the wide area of the equatorial waters and free swimming schools were found near the Equator 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 2000-2004. The data in 2004 is provisional. The catches in 2003 for bigeye, yellowfin and skipjack were 34,836 MT, 50,591 MT and 317,944 MT, respectively. During 2000-2004, the bigeye catch was relatively stable ranging from 32,000 MT to 37,000 MT, but yellowfin catch showed declining trend from 70,000 MT to 41,000 MT. The skipjack catch showed no apparent trend ranging from 372,000 MT to 438,000 MT.

4. Research activities related to tuna and billfish in the WCPFC Convention Area

4. 1. Port sampling

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 length measurements, carried out mainly in 2003 and 2004. Note that size measurement of tunas and billfishes has been carried out on board by research vessels and training vessels other than port sampling and that sex-specific size sampling on board for billfishes by commercial longline vessels in the North Pacific was newly collected from 2003.

<u>Length sampling</u>

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, which catch the fish measured were longline, pole-and-line, trolling and offshore purse seine. The main fishing method for each species differs depending on the species, area and season. In 2003, the number of length data collected for bluefin, albacore, and skipjack were 44,000, 173,000 and 145,000, respectively. And for swordfish and striped marline, the numbers were 50,000 and 8,000, respectively. Although length data of bigeye and yellowfin caught by coastal and offshore longline fisheries has not been collected so intently, length data collection for these tropical tunas was started in Kesennuma (North part of Japan) and Kii-Katsuura (South part of Japan) ports from 2005.

<u>Length sampling for distant water purse seiner</u>

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 twice a month in Yaizu port and once in two months at Makurazaki port. Annual total measurement number in 2004 was 35,000 fishes 10,500 and 4,900 for skipjack, yellowfin and bigeye, respectively. For bigeye and yellowfin the majority of the catch was small fish less than about 70cm in fork length in 2004 (Fig. 13). All three species had modes at about 36-39cm, 45cm and 62-66 cm. The largest mode of skipjack was 38cm in comparison to 55 cm in 2003.

4. 2. Tagging

<u>Tropical tuna tagging project in Japan</u>

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 1,539 bigeye and 6,616 yellowfin of 30-65cm in fork length were released, of which 166 bigeye and 580 yellowfin were recaptured (Table 6). 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.

<u>Skipjack tagging</u>

Three research and two training pole-and-line vessels were involved in the skipjack tagging. In addition, one commercial distant water purse seiner conducted voluntarily tagging when she operated in the temperate waters. Total of 2,624 skipjack and 60 albacore were released in 2004 and 159 skipjack were recovered so far. Of these, 1,184 skipjack were released from the distant water purse seiner and 73 fish were recovered. Tag and releases in the 1st and 4th quarter of 2004 were distributed in the area south of 25˚N. In 2nd and 3rd quarters, the tagging was made mainly in the North western Pacific off Japan.

<u>Billfishes tagging</u>

Two conventional tagging studies have conducted on billfishes. One is joint NRIFSF and Japan Game Fish Association (JGFA) which was initiated in 2004. Major purpose of this study is comparing shedding rates between two types of conventional tags, which are the metal dart type and the nylon dart type. In 2004, these two tags were attached on 10 blue marlins, 2 striped marlins and one sailfish in near shore area of Japan. The other is a tag and release program of JGFA, which was initiated in 1986. This program only uses the nylon dart type of tag, and tags are attached on 32 blue marlins, 3 striped marlins, 2 sailfishes, and one spearfish in 2004.

In addition to those, archival pop-up tags were attached on 6 blue marlins in the southwestern part of Ryukyu Islands and Guam, to study about vertical distribution pattern of blue marlins as well as their migration pattern in the northwestern Pacific. So far, data of four tags among six were successfully obtained though actual pop-off dates of them were earlier than programmed ones.

Shark tagging

Shark tagging program has been conducted since 1996 to examine migration, population structure and life history parameters of pelagic sharks. About 9,000 sharks were tagged from 1996 to 2004, 90 % of which were blue shark. Records of 101 tags recovered provide information on seasonal latitudinal migration of blue shark.

Satellite tagging was conducted to examine timing and route of migration of whale sharks off Japan. Since 2002, ARGOS PTTs or pup-up archival tags were deployed on 11 whale sharks, and their migrations were tracked up to 120 days around Ryukyu Islands and in the East China Sea in summer.

4. 3. Research cruise conducted

Study on the swimming behavior of small tunas around the FADs in open ocean

In 2001, a research cruise was conducted by the R/V Shoyo-Maru in the central Pacific. Small tunas were caught and released around the FADs after they were attached with ultrasonic tags. More than 20 individuals were monitored simultaneously and tracked. The results indicated that smaller fish tended to swim shallower layer than the larger ones but not completely separated. To reinforce this result and obtain more observations, another research cruise was conducted in the EEZ of Solomon Islands and further east during the late October to early November in 2003. Although the number of fish monitored was fewer but it confirmed that bigeye tended to swim slightly deeper waters than yellowfin but they often swam the similar depth range. It was also indicated the lower depth of the swimming range appeared to be restricted by the water temperature (21°C). In the two research cruises described above, only one skipjack was tracked only for short time because skipjack is apt to panic when tag is attached to skipjack, and skipjack tend to leave a certain FADs than yellowfin and bigeye. From June to September in 2005, the third trial is being conducted by R/V Shoyo-Maru. In this cruise, to observe skipjack behavior around FAD is one of main purpose as well as getting further information on bigeye and yellowfin.

Ohmi-Maru research cruise

A sampling cruise for distribution of juvenile skipjack tuna was carried out by the R/V Ohmi-Maru using “TANSYU-type” midwater trawl net during February and March 2005 in the tropical western Pacific (2-25˚N, 135-160˚E). The net was towed at 80-120 m and 0-200 m for one hour at 12 sampling points during the day and at night. A total of 15,191 skipjack tuna with 92 other tuna (*Thunnus* spp.) was collected. Approximately 95 % of the skipjack specimens were caught at one point (4˚00N, 145˚30E), indicating a high concentration of the juvenile. The dominant size of juveniles was 1-10 cm SL. The past research cruise in 1995 showed that high densities of juvenile skipjack appeared near salinity fronts. Therefore the relationship between juvenile distribution and oceanographic conditions was suggested.

4. 4. Bycatch species related research

Mitigation studies

To develop mitigation techniques to reduce incidental mortality of seabirds and sea turtles in longline fishery, at-sea experiments were conducted in the western North Pacific in 2004. Circle hooks, squid and mackerel bait, colored bait and mid-water float system were tested in experimental fishing operations using two research vessels. The results provided important information on mitigation effects of these techniques: Circle hooks reduced deep hooking of sea turtles compared to conventional tuna hooks. Use of mackerel bait reduced catch rates of sea turtles down to 1/5 of that using squid bait. Blue-dyed bait was effective in avoiding seabirds but had little effects on sea turtle bycatch. Mid-water float system, which sets fishing hooks at a certain depth, had a potential to minimize sea turtle bycatch, but practicality and fishing efficiency of the system still need to be assessed (Shiode et al. in press).

Captive experiments on post-hooking survival of sea turtles have been conducted. Two loggerhead sea turtles taken in the experimental fishing operations were kept in captive tanks in the Yaeyama Station of the National Center of Stock Enhancement, Japan. The two turtles were deep-hooked (with fishing hooks hanging at the oesohpagus), but the fishing hooks were discharged within a year, and both turtles are still surviving. The results suggest that with proper handling and rescue treatment, live-captured sea turtles have chances of survival even if they were released with fishing hooks remaining inside.

Sea turtle nesting survey

To evaluate nesting and post-nesting environment of leatherback and loggerhead turtles of the North Pacific, nesting survey and satellite tracking were conducted. The leatherback survey was conducted in Jamursba-medi and Wermon, Papua, Indonesia with the collaboration of the Indonesia Sea Turtle Research Center and a Japanese NPO, Ever-lasting Nature (Suganuma et al. 2005). Number of nests counted was 2000-3000 in Jamursba-medi and 500 in

Wermon. In Jamursba-medi, a leatherback conservation program has been promoted with the cooperation of native people. Egg poaching has been prohibited since 1993, and recently electric fences have been constructed to protect nests and eggs from feral pigs. Satellite tracking of post-nesting females showed a possibility that adult females nesting in Jamursba-medi and Wermon had different feeding areas in the North Pacific and in the South Pacific, respectively.

The loggerhead survey was conducted in Omaezaki, Japan. About 100 nests were counted in 2004 but the number of nests fluctuated annually. All the eggs were transplanted to an artificial hatchery because most of eggs cannot survive until hatching due to extensive beach erosion in the nesting area. Results from satellite tracking and stable isotope analysis indicated that loggerhead sea turtles had two different feeding areas in the western North Pacific off Japan and in the East China Sea.

Stock assessment of pelagic sharks

To assess the impact of longline fishery on pelagic shark resources, long-term trends of shark CPUE were analyzed using recent and historical data collected by Japanese research and training vessels in the western North Pacific. Standardized shark CPUE in the 1930's, 1960's and 1990's did not show steep decline but were rather constant between these periods. Average body lengths of blue sharks showed minor decline in some area. The maximum decline of 13% was recorded at higher latitudes, which corresponded to 36 % reduction in body weight. Results of the analysis indicated that both CPUE and body size of pelagic sharks varied temporally and spatially, but did not show any sign of basin-range long-term reduction in population size and biomass.

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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*

	2000	2001	2002	2003	2004
0-10 ton	291	339	342	(342)	(342)
10-50 ton	444	442	442	(442)	(442)
50-200 ton	187	186	179	(179)	(179)
200-500 ton	493	490	484	(484)	(484)
500+ ton	3	4	0	(0)	(0)
total	1,418	1,461	1,447	(1,447)	(1,447)

Pole-and-line

	2000	2001	2002	2003	2004
0-10 ton	265	199	176	(176)	(176)
10-50 ton	93	87	76	(76)	(76)
50-200 ton	113	108	103	(103)	(103)
200-500 ton	47	47	48	(48)	(48)

Purse Seine

	2000	2001	2002	2003	2004
0-200 ton	23	19	18	(18)	(18)
200+ ton	37	36	36	(36)	(36)

* 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.

	2000	2001	2002	2003	2004
Number of hooks	128	122	119	125	(118)
Albacore	12,848	14,651	9,770	7,743	(8,658)
Bigeye	23,119	23,102	23,992	20,917	(21,910)
Yellowfin	20,823	12,288	12,030	12,058	(9,400)
Swordfish	6,260	6,006	5,957	5,935	(6,500)
Striped marlin	1,033	1,066	680	1,148	(791)
Blue marlin	2,297	1,962	1,759	2,043	(2,094)
Black marlin	76	39	80	46	(60)
Skipjack	20	79	56	98	(61)
Sailfish	29	41	72	86	(65)
Shortbill spearfish	128	89	66	82	(86)
Total	66,633	59,324	54,463	50,157	(49,625)

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.

	2000	2001	2002	2003	2004
Number of fishing day	23,593	22,050	20,960	20,664	(20,664)
Number of pole	428,140	405,319	390,937	391,562	(391,562)
Albacore	21,502	29,225	49,443	34,580	(34,580)
Bigeye	1,792	1,321	1,714	822	(822)
Yellowfin	3,475	2,616	2,501	2,089	(2,089)
Skipjack	138,860	96,144	90,466	115,257	(115,257)
Total	165,629	129,306	144,124	152,748	(152,748)

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.

	2000	2001	2002	2003	2004
Number of fishing day	9,259	8,032	8,320	8,677	8,837
Albacore	2,161	979	3,072	837	6,932
Bigeye	4,735	6,125	4,587	5,099	4,577
Yellowfin	36,125	33,735	19,138	27,120	22,627
Skipjack	167,726	169,328	188,052	187,338	172,563
Total	210,746	210,166	214,848	220,394	206,699

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.

		2000	2001	2002	2003	2004
Bigeye	Total	36,017	36,403	37,009	34,836	(31,717)
	Distant water and Offshore LL	23,119	23,102	23,992	20,917	(21,910)
	Distant water and Offshore PL	1,792	1,321	1,714	822	(822)
	Tuna PS	4,735	6,125	4,587	5,099	4,577
	coastal LL	6,042	5,587	6,510	7,792	(4,202)
	coastal PL	125	56	43	(43)	(43)
	coastal PS		1	2	(2)	(2)
	Troll	190	182	126	(126)	(126)
	Unclassified	14	29	35	(35)	(35)
Yellowfin	Total	70,122	58,241	41,367	50,591	(41,406)
	Distant water and Offshore LL	20,823	12,288	12,030	12,058	(9,400)
	Distant water and Offshore PL	3,475	2,616	2,501	2,089	(2,089)
	Tuna PS	36,125	33,735	19,138	27,120	22,627
	coastal LL	6,895	5,944	3,896	5,522	(3,488)
	coastal PL	377	520	874	(874)	(874)
	coastal PS	6	2	87	(87)	(87)
	Troll	2,258	2,840	2,524	(2,524)	(2,524)
	Unclassified	163	296	317	(317)	(317)
Skipjack	Total	331,416	281,734	293,819	317,944	(303,127)
	Distant water and Offshore LL	20	79	56	98	(61)
	Distant water and Offshore PL	138,860	96,144	90,466	115,257	(115,257)
	Tuna PS	167,726	169,328	188,052	187,338	172,563
	coastal LL	149	73	78	84	(79)
	coastal PL	8,926	7,288	6,901	(6,901)	(6,901)
	coastal PS	49	852	1,024	(1,024)	(1,024)
	Troll	14,528	6,949	6,376	(6,376)	(6,376)
	Unclassified	1,158	1,021	866	(866)	(866)

Table 6. 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		2000	2001	2002	2003	2004	Total
Bigeye tuna	Release	453	363	224	352	147	1539
	Recapture	78	35	29	22	2	166
	% recapture	17.2%	9.6%	12.9%	6.3%	1.4%	10.8%
Yellowfin tuna	Release	1042	1417	1409	1309	1280	6457
	Recapture	126	83	204	98	31	542
	% recapture	12.1%	5.9%	14.5%	7.5%	2.4%	8.4%
Total	Release	1495	1780	1633	1661	1427	7996
	Recapture	204	118	233	120	33	708
	% recapture	13.6%	6.6%	14.3%	7.2%	2.3%	8.9%

Archival tag

Species		2000	2001	2002	2003	2004	Total
Bigeye tuna	Release	23	13	20	14	1	71
	Recapture	6	1	4	1	0	12
	% recapture	26.1%	7.7%	20.0%	7.1%	0.0%	16.9%
Yellowfin tuna	Release	6	25	9	21	8	69
	Recapture	0	1	1	1	0	3
	% recapture	0.0%	4.0%	11.1%	4.8%	0.0%	4.3%
Total	Release	29	38	29	35	9	140
	Recapture	6	2	5	2	0	15
	% recapture	20.7%	5.3%	17.2%	5.7%	0.0%	10.7%

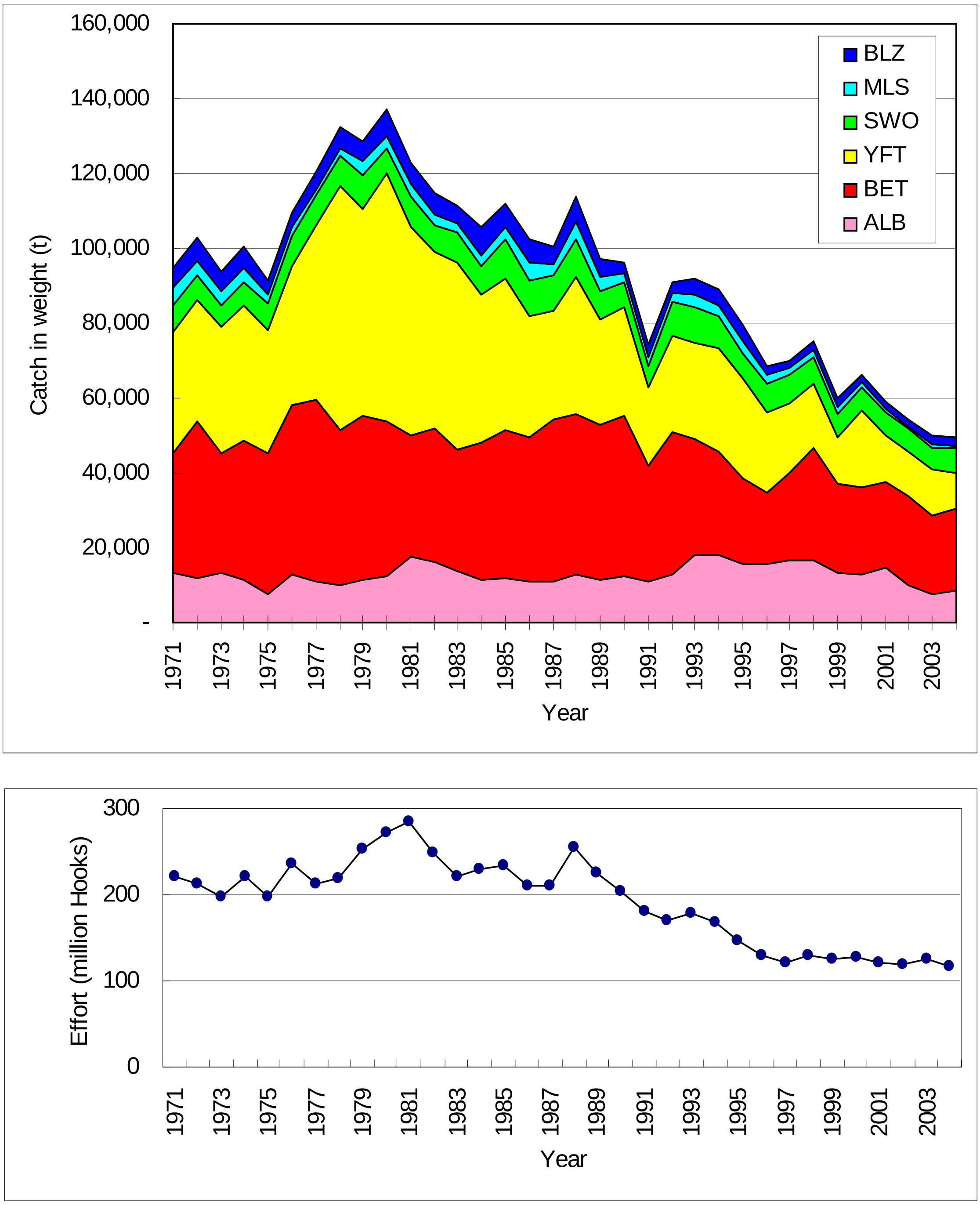


Fig. 1. Historical change of fishing effort and catches by species for the Japanese longline fishery (>20GRT) in the WCPFC Convention Area.

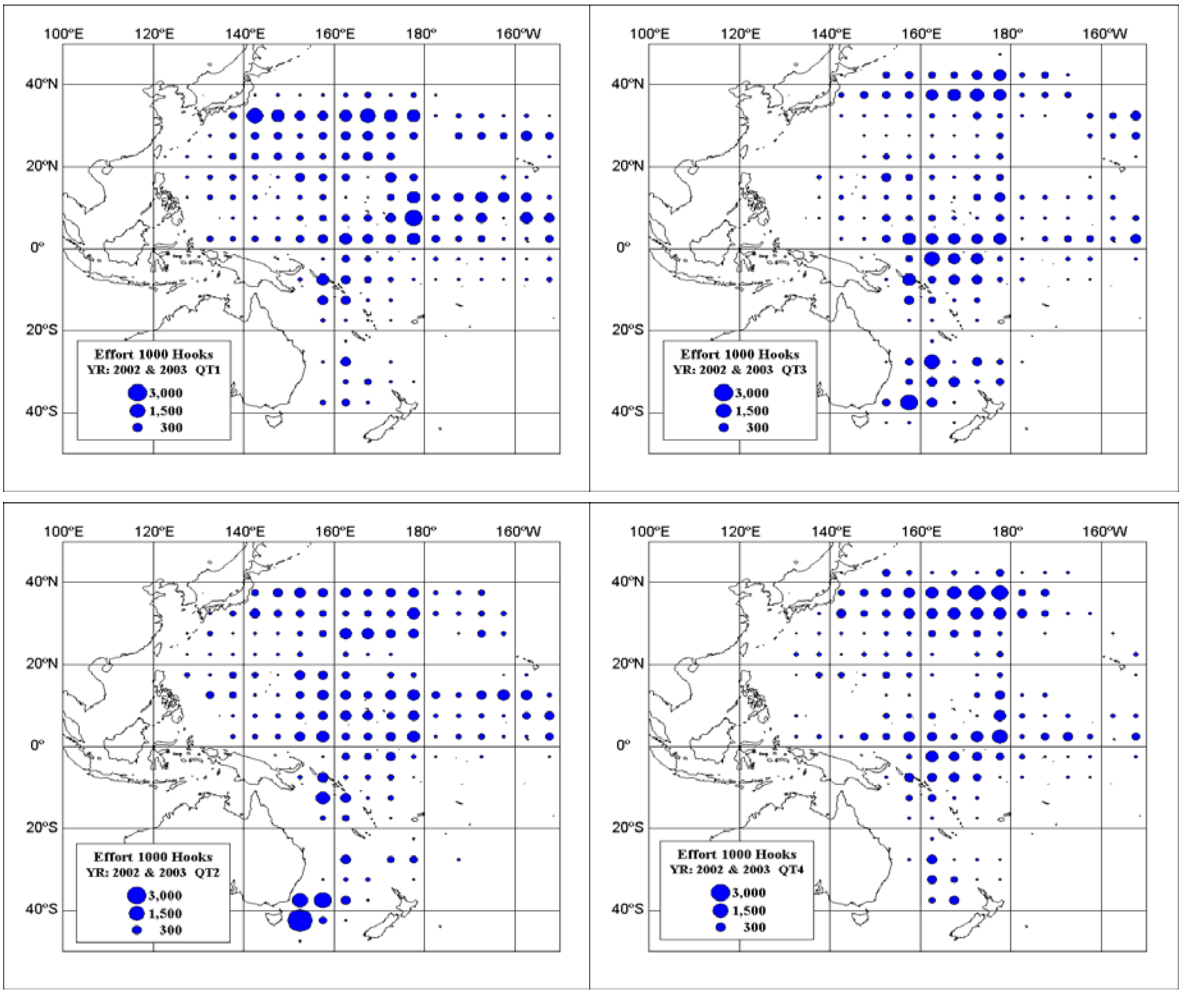


Fig. 2. Quarterly distribution of fishing effort for the Japanese offshore and distant water longline fisheries in the western and central Pacific Ocean in average of 2002-2003.

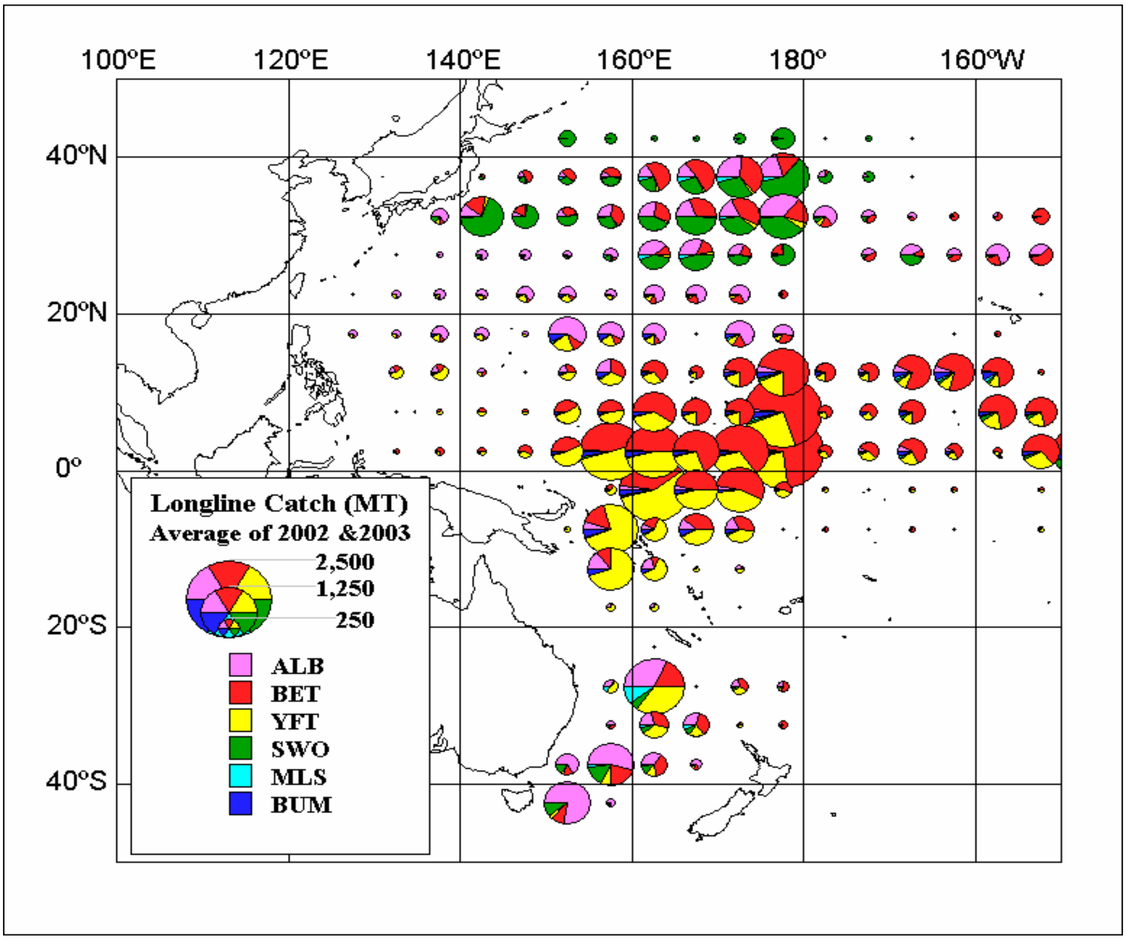


Fig.3. Distributions of offshore and distant water longline catch (weight) by species in average of 2002-2003 for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BUM: blue marlin).

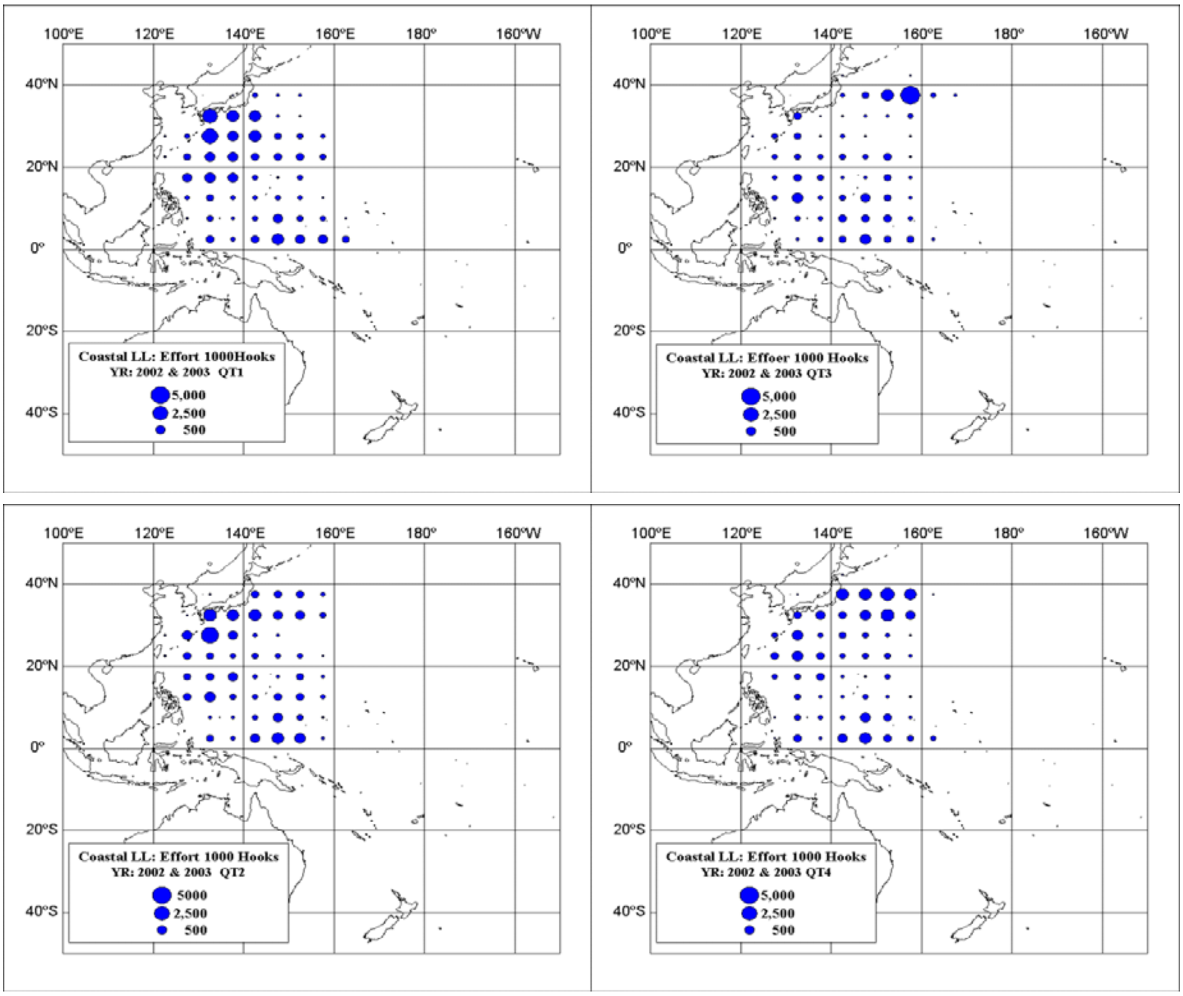


Fig. 4. Quarterly distribution of fishing effort for the Japanese coastal longline fisheries (less than 20 GRT) in the western and central Pacific Ocean in average of 2002-2003.

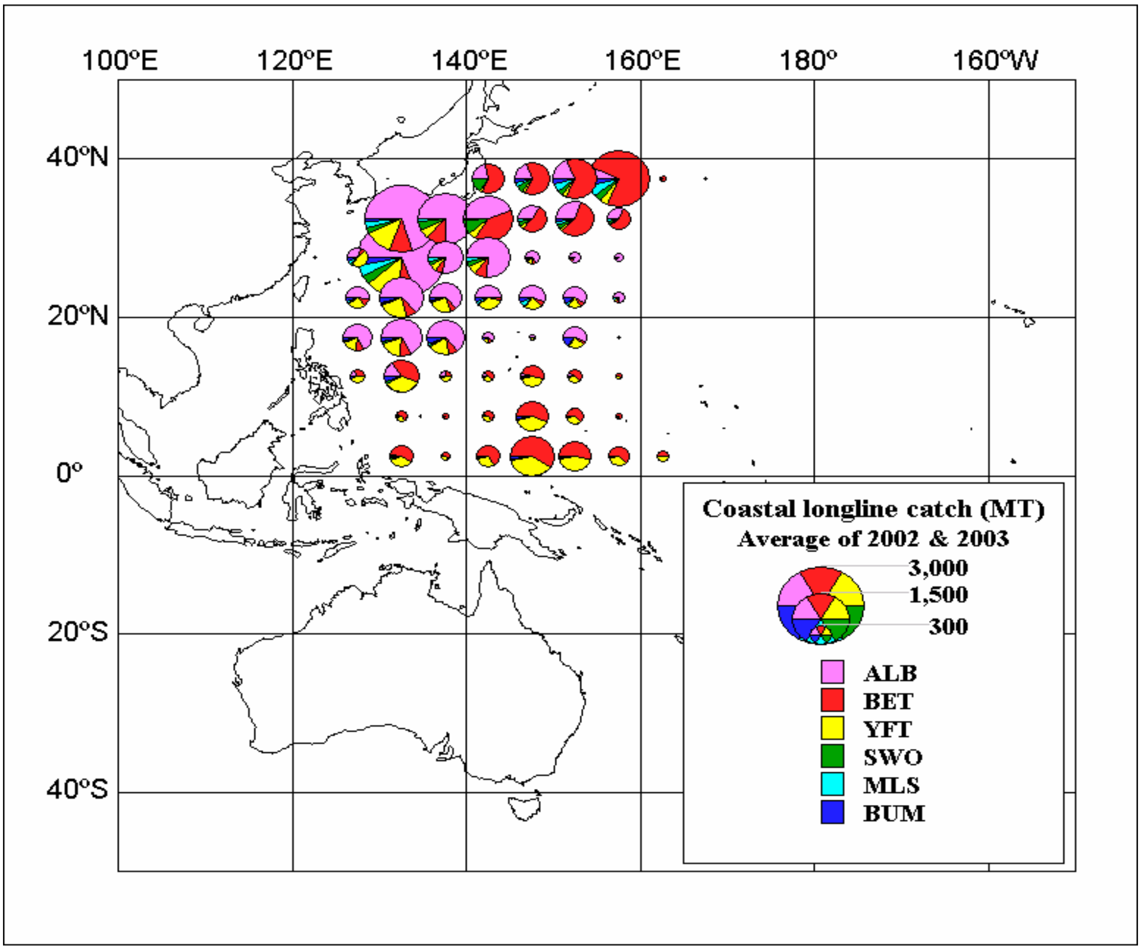
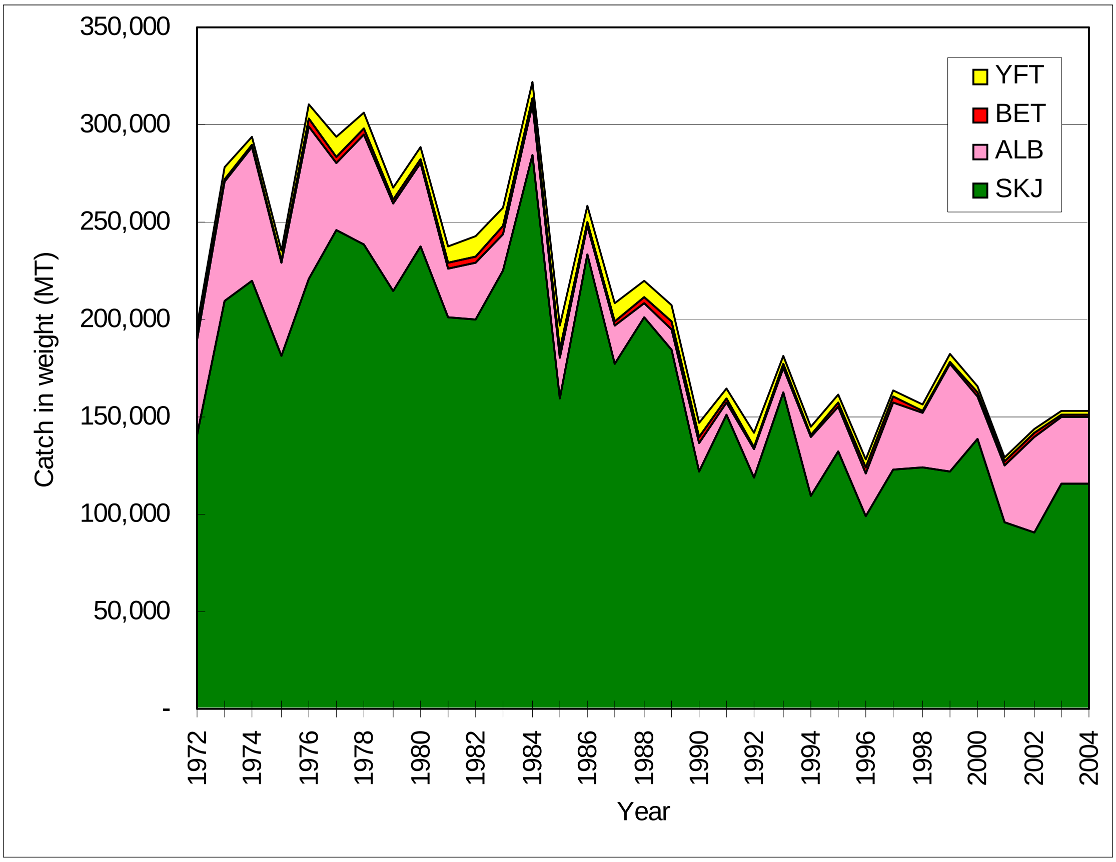


Fig. 5. Distributions of coastal longline catch (weight) by species in average of 2002-2003 for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: blue marlin and BUM: striped marlin).



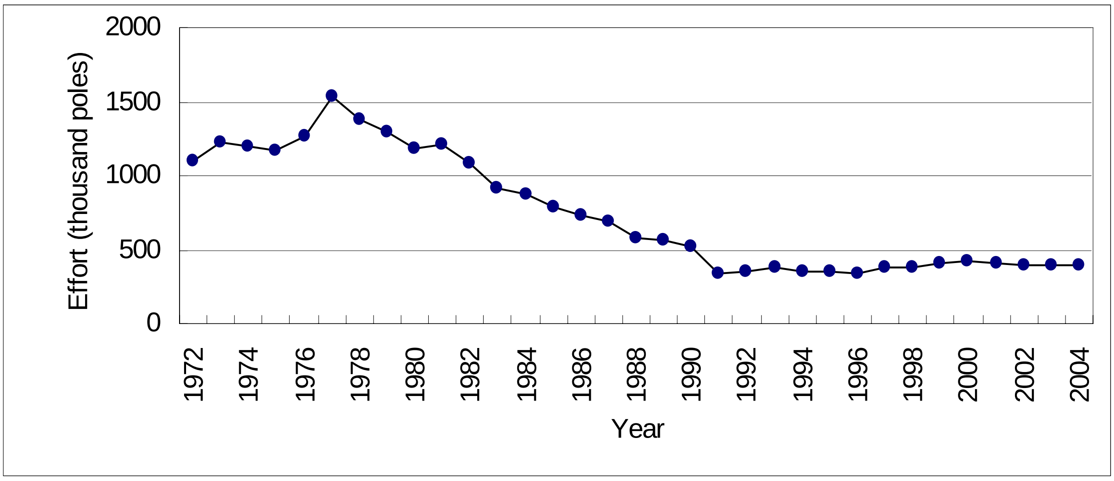


Fig. 6. Historical change of fishing effort and catches by species for the Japanese pole-and-line fishery (>20GRT) in the WCPFC Convention Area.

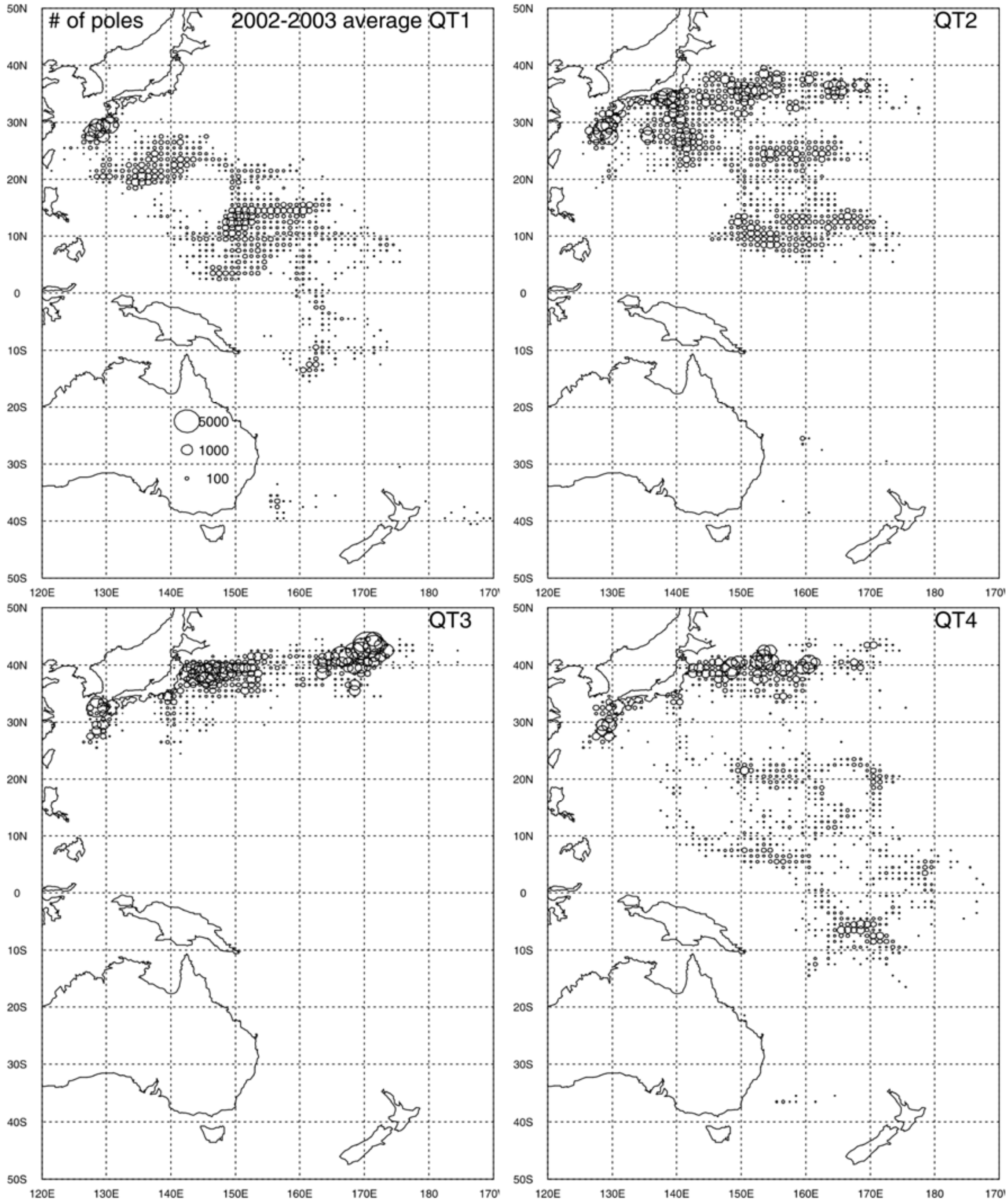


Fig. 7. Quarterly distribution of fishing effort for the Japanese pole-and-line fishery (offshore and distant water licenses) in the Pacific Ocean in average of 2002-2003.

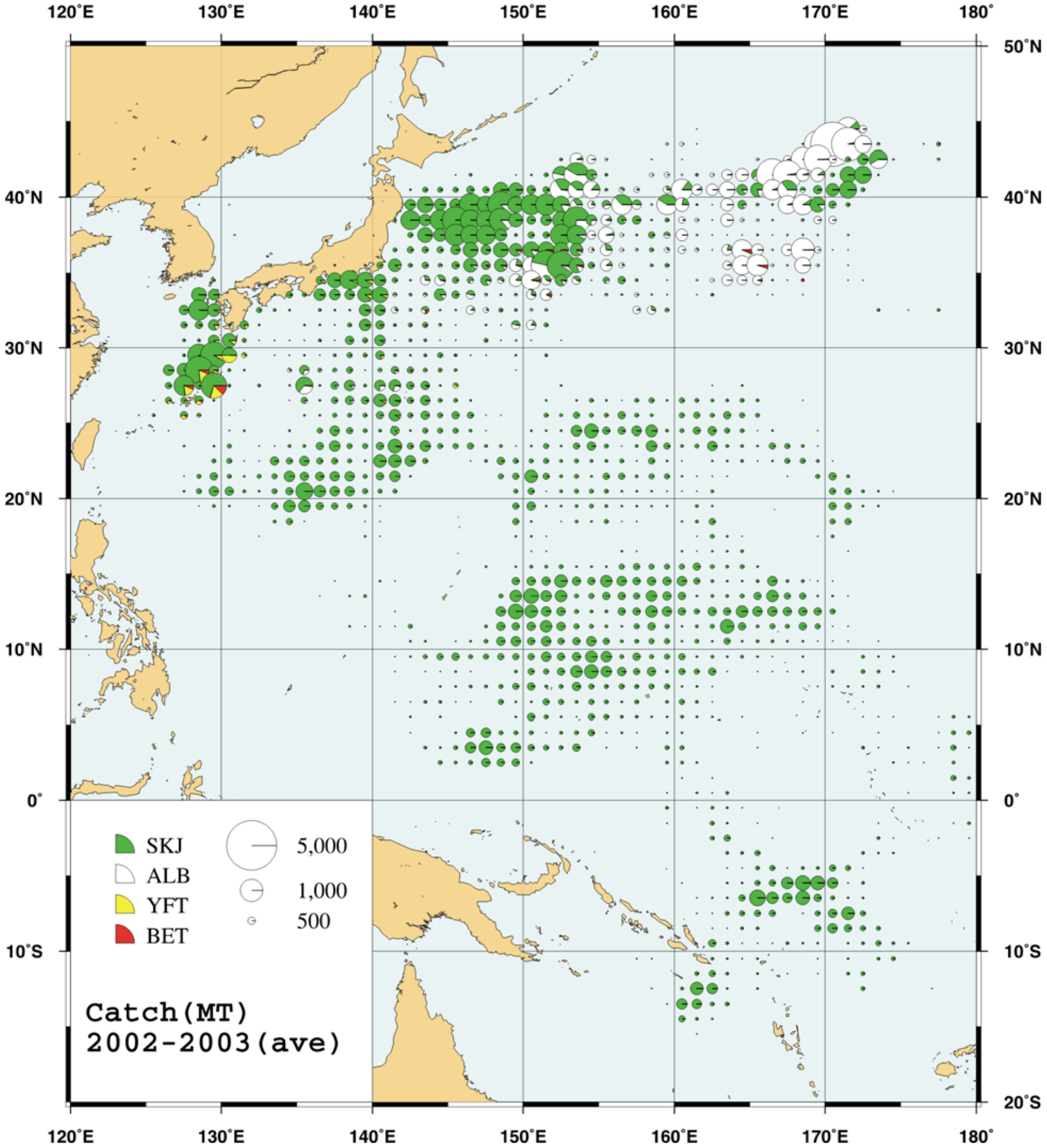
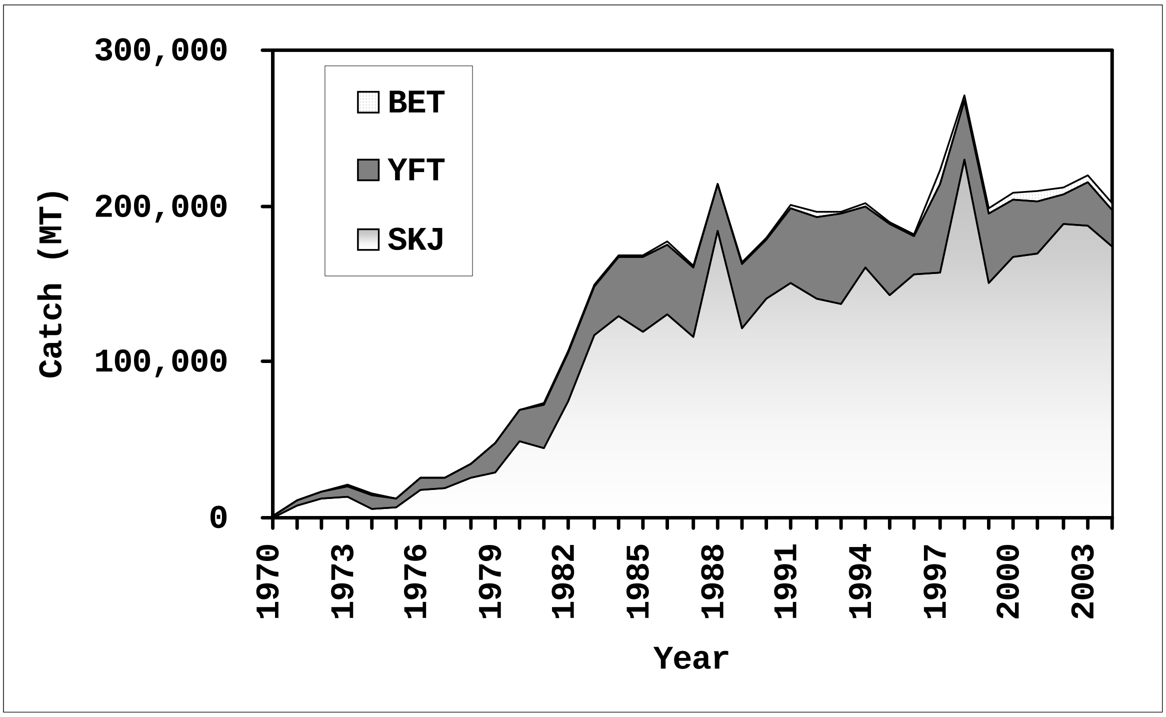


Fig. 8. Distribution of catch and its species composition for the Japanese offshore and distant water pole-and-line fishery in average of 2002-2003.



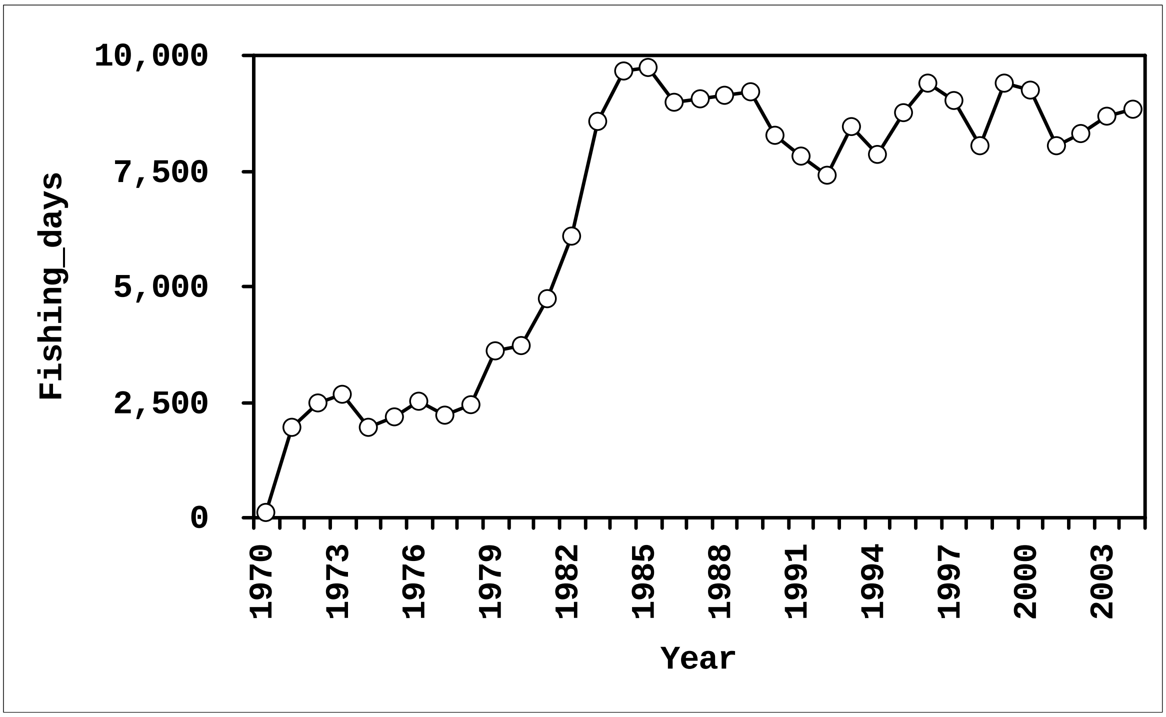


Fig. 9. Trends of fishing effort and catches by species for the Japanese tuna purse seine fishery in the WCPFC Convention Area.

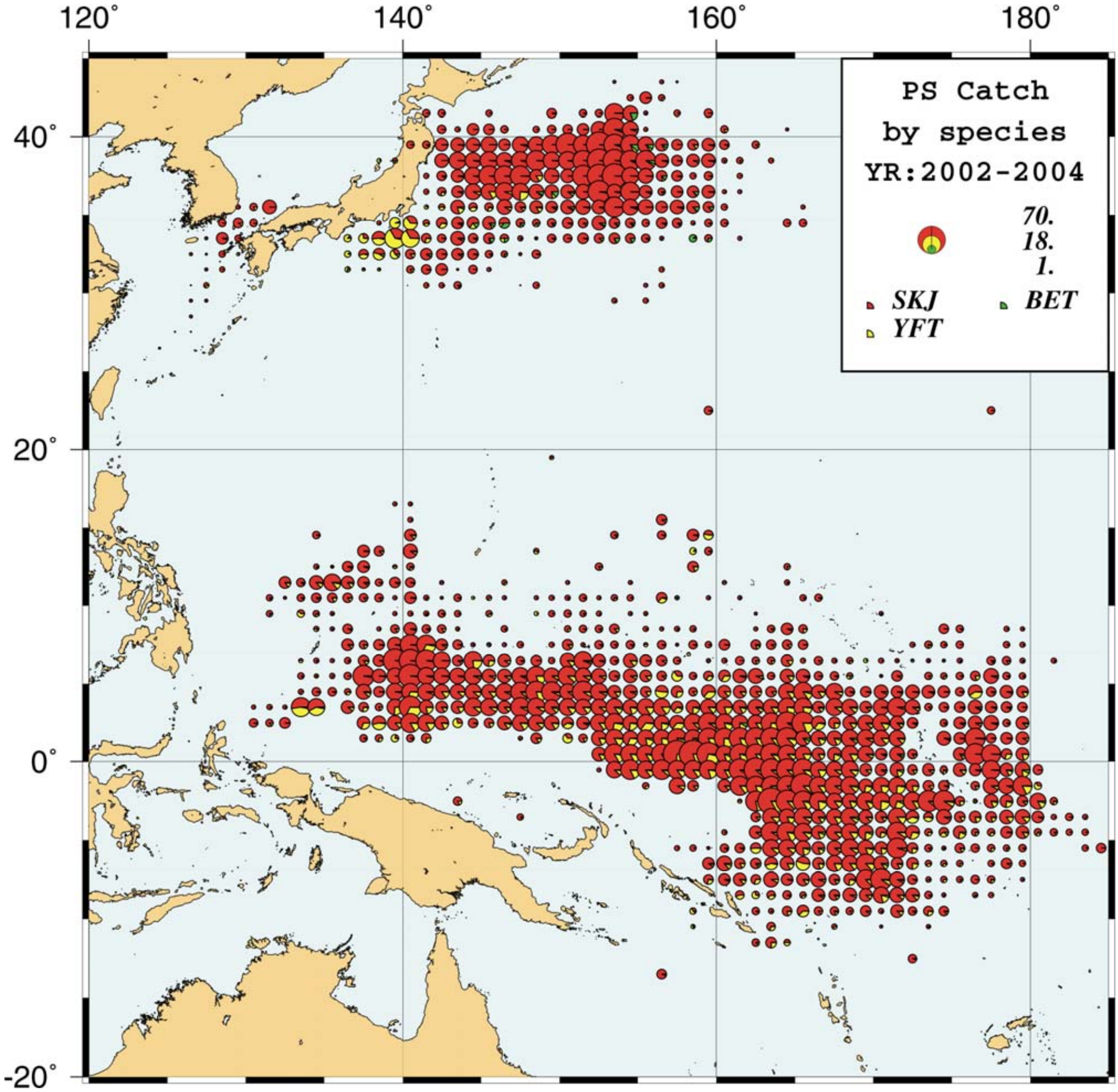


Fig. 10. Distribution of tuna purse seine catch (MT) by species for tropical tuna species (bigeye, yellowfin and skipjack) combined for 2002-2004.

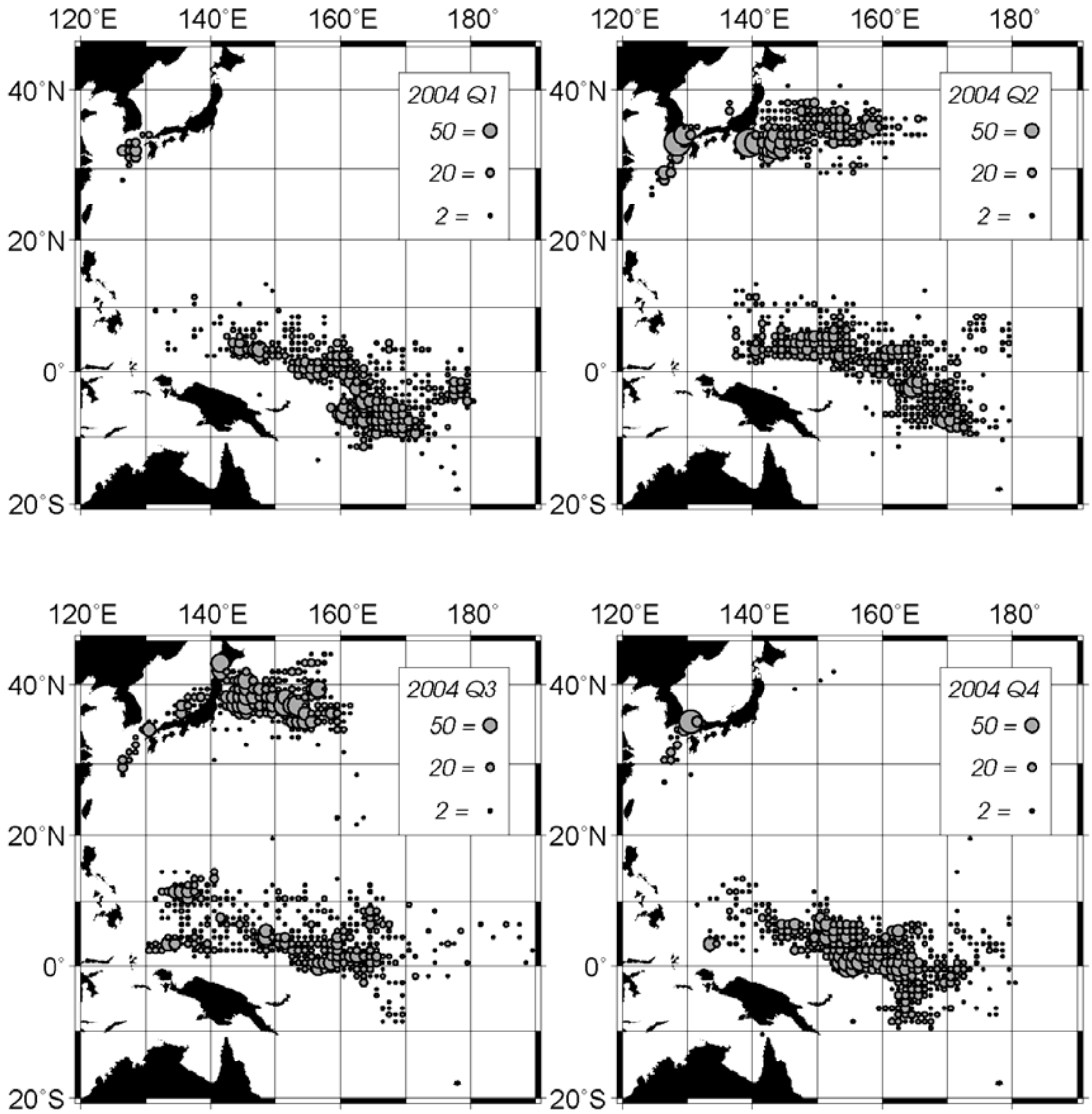


Fig. 11. Quarterly distributions of fishing effort (fishing days including searching days) for the Japanese tuna purse seine fishery in the Pacific Ocean in 2004.

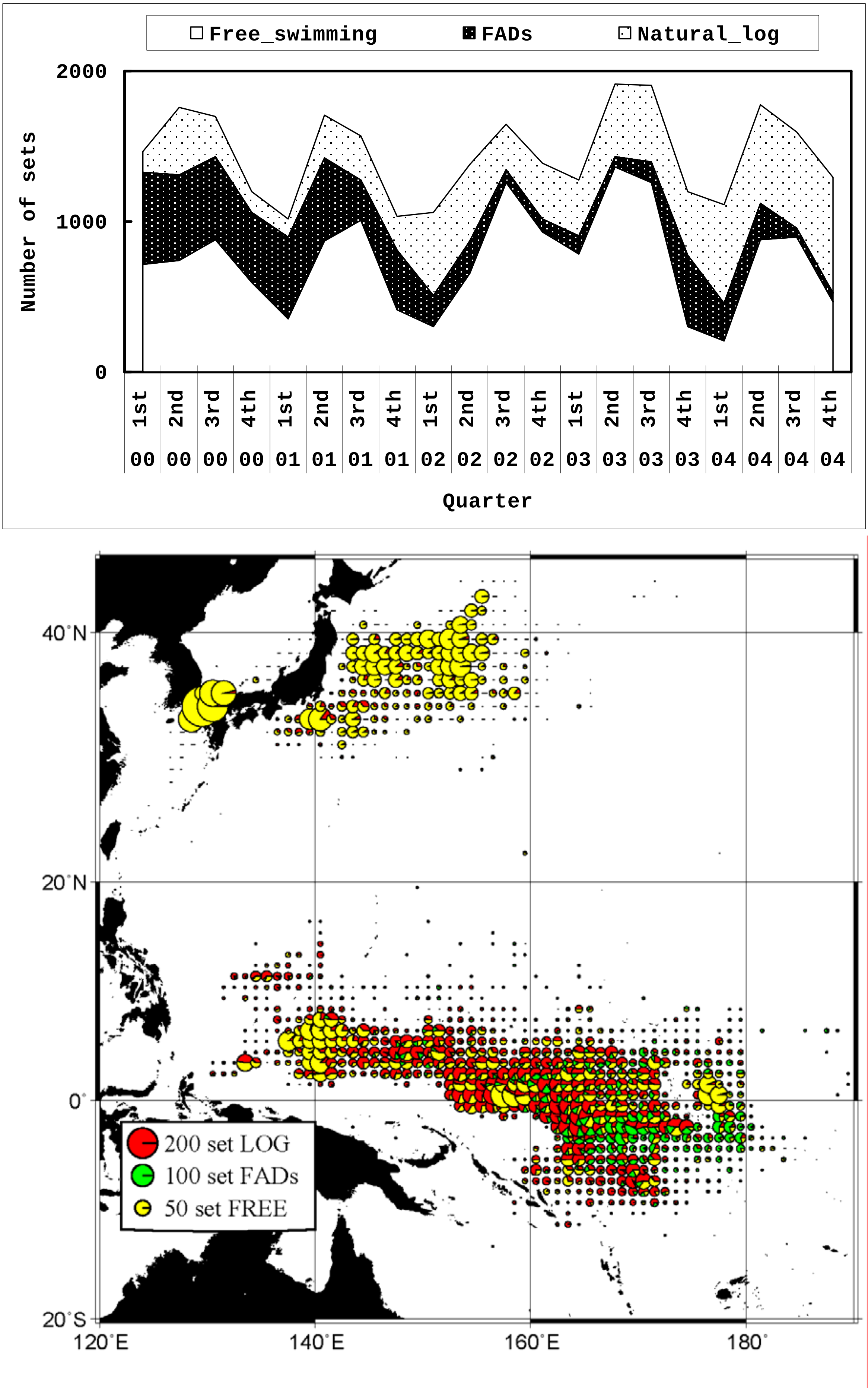


Fig. 12. Trend of quarterly number of sets by type of school since 2000 (upper) and distribution of sets by type of school (lower) for 2002-2004 deployed by the tuna purse seine fishery by Japan.

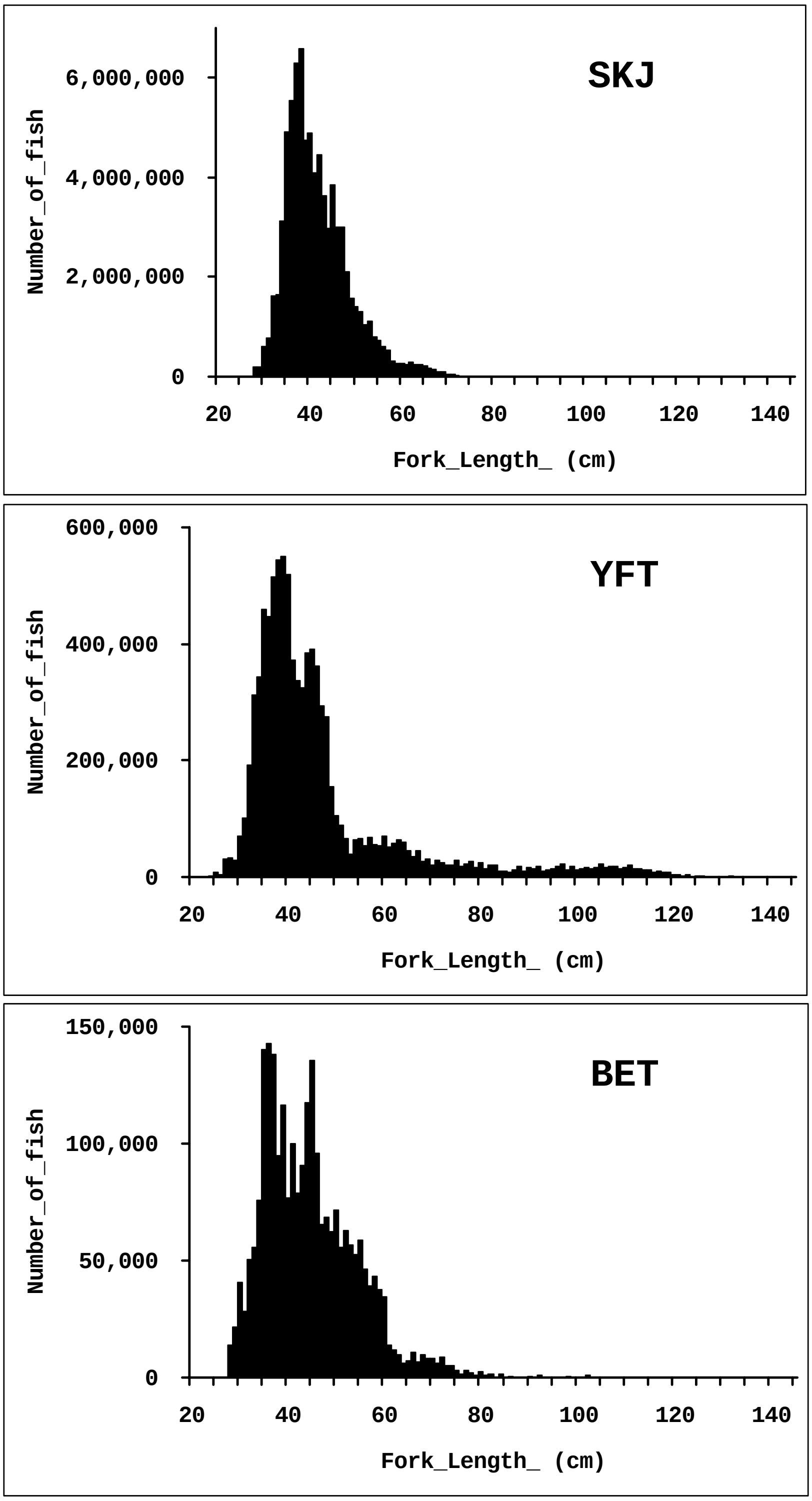


Fig. 13. Annual length frequency distribution of purse seine-caught fish in equatorial waters in 2004.