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PART 1: INFORMATION ON FISHERIES, RESEARCH, AND STATISTICS

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JAPAN

ANNUAL REPORT TO THE COMMISION
PART1 : INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

National Tuna Fisheries Report of Japan

Fisheries Agency of Japan

and

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

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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 by 30 April, 2009	YES Catch and effort data (LL) for assessment, April 21 Size data (BET and YFT) for assessment, April 21 Annual catch data, May 1 Size data (ALB) for assessment, May 1 Catch and effort data, May 11
If no, please indicate the reason(s) and intended actions: This year, compilation work for pole-and-line fisheries for 2007 was delayed.	

SUMMARY

This paper describes recent trends in the Japanese fishing activities by longline, pole-and-line, purse seine and other fisheries mostly taking tuna and billfish fisheries in the WCPFC Convention Area (WCP-CA), including fleet size, catch and fishing effort statistics. Total number of commercial longline vessels (larger than 10 GRT) was 533 in 2007 which is 47 vessels (8%) less than that in 2006. Total number of pole-and-line vessels (larger than 20 GRT) was 116 in 2007 which is 7 vessels (6%) less than that in 2006.

The total WCP-CA catch of tunas (Pacific bluefin, albacore, bigeye, yellowfin and skipjack) by the Japanese fishery in 2007 was 482,840 mt that corresponds to 105% of 459,679 mt in 2006. In 2007, the catch of tunas by the purse seine fishery was 270,997 mt (56% of the total catch of tunas), with 128,632 mt (27%) by the pole-and-line, 69,943 mt (15%) by the longline, and the remaining 3%was made by the other gears.

With respect to the research activities for tunas and billfishes, tagging studies for tropical tunas and sharks, bluefin tuna larval sampling, longline fishing and collection of gonad samples for albacore were conducted. Currently, a research cruise to investigate behavioral characteristics of juvenile bigeye is being conducted in the western Pacific with the participation of a research boat of Fisheries Agency, FRA tuna purse seiner and commercial purse seiner. Starting in September, two research cruises are also scheduled to investigate swordfish and bigeye habitat in relation to the oceanographic features in the North Pacific.

In addition, as a bycatch mitigation related researches, experiments of circle hook in reducing hooking mortality of sea turtles, evaluation of side setting performance in longline operation, and sea turtle nesting survey was conducted.

1. Introduction

This paper describes recent trends in the Japanese tuna and billfish fisheries, e.g., longline, pole-and-line, purse seine and other miscellaneous coastal fisheries in the WCPFC Convention Area (WCP-CA), including fleet size, catch and fishing effort statistics. Catch statistics for measure fisheries (longline and pole-and-line boats larger than 20 GRT, longliner larger than 10 GRT, tuna purse seine) are compiled by the National Research Institute of Far Seas Fisheries (NRIFSF), but other fisheries are not covered by the same Institute. Therefore, catch statistics for those fisheries are referred to the publication of the Statistics Division of the Ministry of Agriculture, Forestry and Fisheries for 2004-2006 (MAFFJ 2006-2008), and presented in this paper. Although the MAFFJ 2009 was not officially published at the time when this manuscript was written, the catch statistics for 2007 was made available to be included in this paper by the special arrangement. With respect to the recent research activities, a brief explanation was given at the end of this report.

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 2004-2008. The data source of this number of active vessels is based on logbook data except for that for longline less than 10 GRT. Therefore some vessels who actuary operated but did not submit logbook were not included. Note that the data source used here was different from that on the *National Tuna Fisheries Report of Japan* in the last year. The number of active vessels shown in the last year's report was based on MAFFJ 2005-2008, but it decided that MAFFJ did not provide number of active vessels any more on the publication in 2009 (data for 2007).

Japanese longline boats are classified into three categories (coastal, offshore and distant water longline fisheries) according to the operation area and boat size. Coastal longliner is 0-20 GRT, and is allowed to fish only in the Japan's EEZ. Offshore longline boats are further divided into two, small offshore, 10-20 GRT, and offshore, 20-120 GRT, longlines both of which are able to go beyond the Japan's EEZ but limited to operate only in the western and central Pacific. Distant water longliners are over 120 GRT and basically can fish at all oceans, but need to follow the various domestic regulations that will ensure the management measures in place by the respective tuna RFMO.

Distant water longline vessels (over 120 GRT) decreased in number steadily from 211 in 2004 to 142 in 2007. Although offshore longliners also indicate a declining trend from 100 in 2004 to 74 in 2007, the number of small sized longliners (coastal and small offshore longline, 10-20 GRT) has been kept in the same level, more than 300. Although recent number of coastal longline vessels smaller than 10 GRT is not available, there existed 311 vessels in 2006.

In March, 2009, the Government of Japan implemented the fleet reduction program for logline vessels, which is to meet the reduced catch quota for Japan and to reduce the excess fishing capacity resulted from the strengthened management measures that were agreed in the various tuna RFMOs. The number of vessels reduced by this plan was a total of 87 vessels, 64 distant-water longline vessels and 23 offshore longline vessels. These vessels had stopped their operation and returned to Japan by the end of March, 2009.

Total number of pole-and-line vessels (larger than 20 GRT) shows a declining trend since 2005. The number was 116 in 2007 which is 7 vessels (6%) less than that in 2006. The number of vessels of largest size category (over 200 GRT) was 36 in 2006 which corresponds to 80% of 45 vessels in 2005. The decreasing rate in 2005 was relatively large. The number of medium-sized vessel categories, 50-200 GRT, was decreased from 92 in 2005 to 80 during the 2005 to 2007 period, corresponding to 13% decrease. The number of coastal pole-and-line vessels (smaller than 20 GRT) in 2006 (the most recent year in the statistics) was 213.

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 - 200 GRT class vessels operate in the coastal and offshore waters of Japan north of 20˚N. The number of vessels of 50-200GRT that engaged in tuna fishery has slightly increased

from 30 in 2004 to 36 in 2008. The number of distant water purse seiners was 36 and has been stabilized since 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 2007 was 482,840 mt corresponding to 105% of 459,679 mt in 2006. In 2007, the catch of tunas by the purse seine fishery was 270,997 mt (56% of the total catch of tunas), with 128,632 mt (27%) by the pole-and-line, 69,943 mt (15%) by the longline, and the remaining (3%) by the other gears. The following is the description of each fishery including tables of their catch and effort in the WCP-CA whereas catches for bigeye, yellowfin, blue marlin, black marlin and skipjack in the portion of the WCP-CA east of the 150˚ meridian of west longitude, and catches for Pacific bluefin, albacore, swordfish and striped marlin in other broad ocean areas are shown in Appendix Tables 1 and 2. Note that there are some catches in the portion of the WCP-CA east of the 150˚ meridian of west longitude only by the distant-water and offshore longline fisheries.

3.1. Longline fishery (larger than 10 GRT)

Most recent statistics are 2007 data. Catch in weight of all tuna species (Pacific bluefin, albacore, yellowfin, and bigeye), swordfish and billfishes (striped marlin, blue marlin, black marlin, sailfish and shortbill spearfish) caught by the Japanese offshore (20-120 GRT) and distant water (over 120 GRT) longline fisheries in the WCP-CA from 2004 to 2008 are shown in Table 2. Since the logbook coverage for 2008 was still under compilation, the 2007 statistics are carried over to 2008. Historical changes in fishing effort and catch by species are shown in Fig. 1 and 2, respectively, for the years 1971-2007. 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 total effort was about 70 % until the mid 1990s, then it has been decreased to about 40-50% in the latest decade. In the WCP-CA, around 60% of the total Pacific effort has been deployed since the mid 1980s. The fishing effort in the WCP-CA, which was 106 million hooks in 2004, decreased to less than 100million, thereafter. In 2007, fishing effort exerted in the WCP-CA was 95 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 1993 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 average quarterly effort distribution for longline vessels larger than 20 GRT for 2006 and 2007 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 species composition for the longliners whose vessel size is 10- 20 GRT (coastal longliner larger than 10 GRT and small offshore longliner) 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 2004 to 2008. In addition to this, historical changes in catch by species

and effort are shown in Fig. 7 for the period of 1972-2008. Note that it is not possible to provide 2008 statistics for pole-and-line fisheries as the logbook is still under compilation and that figures in 2008 is preliminary. Both the catch and effort gradually decreased throughout 1980s with a peak being around the late 1970s. After 1991, total catch indicated a fluctuation but not much changes in terms of effort and 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, but around 120,000 mt in 2006 and 2007. 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 about 16,000 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, and at 300,000 poles level since 2006.

In 2007, the number of fishing days (including no catch) was 16,154 days, declining (22%) from 2005, and the number of poles was 305,000 poles, also declining (21%) from 2005. Total catch of major species (skipjack, bigeye, yellowfin, albacore and bluefin) in 2007 was 117,643 mt, corresponding to 78% of that in 2005 (Table 3). Catches of skipjack and albacore which are two major species caught by the pole-and-line fishery were 77,374 mt and 36,377 mt, respectively. While the skipjack catch considerably decreased (40%) from 128,703 mt in 2005, the albacore catch sharply increased (221%) from 16,473 mt

Seasonal fishing grounds of this fishery are shown as the quarterly distribution of fishing effort (fishing days in 1x1 degree area) in average of 2006-2007 (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 subtropical 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 the 3rd quarter 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 catches 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 270,000 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 2008 obtained from the logbook in the WCP-CA by this fishery was 185,000 mt, 29,000 mt and 5,100 mt for skipjack, yellowfin and bigeye, respectively. The three species catch stabilized in recent three years (Table 4). Note that catch statistics for purse seine in 2008 is still preliminary but near final. 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 as shown in Fig. 11.

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 shifts. In near shore Japan at Pacific side skipjack fishing season

starts in April and continue until 3rd quarter.

This fishery utilizes tuna schools in association with natural log, whale shark 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. Other coastal fisheries

There are miscellaneous coastal fisheries, which catch tunas and tuna like species such as troll, setnet and gillnet fisheries. The catches for such fisheries for the 2004-2008 is shown in Table 5. The data in 2008 are provisional.

The troll fishery takes various pelagic species including tunas. The size of troll vessels are generally small, mostly less than 10 GRT, and make one-day trip. Skipjack is very important resources for troll fishermen and decline of skipjack catch by troll along the Pacific coast in the western Japan is getting big issue in recent years.

The setnet fishery also catches pelagic species including tunas.

There used be two kinds of large scale gillnet (driftnet) fisheries. One is large-mesh driftnet fishery, which fished billfishes and tunas, and the other is squid driftnet fishery, which fished flying squid. Those fisheries stopped operations on the high seas of the North Pacific in January 1993. This was a result of a moratorium on the use of large-scale driftnets on the high seas.

3.5. 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 6 for 2004-2008. The data in 2008 are provisional. Total catch of bigeye increased to 35,035 mt in 2006 (121%) from 29,303 mt in 2005 due to the increase by the both distant water and offshore and coastal longline catches. After that, the catch was leveled off at 34,236 mt in 2007. Total catch of yellowfin decreased to 46,311 mt in 2007, by 7 %, from 49,814 mt in 2006. Total catch of skipjack slightly decreased since 2005 and was 318,827 mt in 2007, almost the same catch in 2006.

4. Status of tuna fishery data collection systems

4.1. Logbook data collection and verification

Longline

The owners of fishing vessels larger than or equal to 10 GRT are required to submit the log sheet on their operations and catch information to the Japanese government, by each cruise in three months after the cruise was finished. Starting in March 2008, distant water longliners are required to submit it every ten days. In the log sheet of longline, set by set data on catch number and weight in each species, and other information data such as fishing date and location, fishing effort (the number of basket and hooks used), water temperature are included. Catch weight information was not included in the logbook till 1993. The number of hooks per basket is important information as it suggests the depth of the gear and target species. As tuna and tuna-like fishes, six tunas (Pacific bluefin, southern bluefin, albacore, bigeye, yellowfin and skipjack), and six billfishes (swordfish, striped marlin, blue marlin, black marlin, sailfish and shortbill spearfish) are separately recorded in the logsheet. Additionally, information on the cruise (date and port of departure and arrival of the cruise), vessel (name, size, license number and call sign), number of crew and the configurations of the fishing gear (material of main line and branch line) are asked to fill on the top part of the sheet by each cruise.

Submitted logsheets are processed into electronic data files. Various error checks, such as date, location, range of weight, CPUE, are conducted before these data are finalized. Vessel characteristics (call sign, name, license number, etc) are verified with a register.

Because the coverage rate of logsheet is not 100% for longline fishery, it is necessary to raise the sample values to represent 100 %. For both of the distant water and offshore longline fisheries (20-120 GRT, excluding 10-20 GRT vessels that operate outside of Japanese EEZ), coverage rate has been about 90 - 95% of total

operation (Table 7). In the case of distant water longline fishery, information on the total number of operations are provided by sub-areas and month by the fishermen's association (Federation of Japan Tuna Fisheries Co-operative Association) so that relatively correct raising can be done. For the offshore longline vessels larger than 20 GRT, total number of operation by prefecture (which the vessel belongs to) by year given by MAFFJ has been used for the raising. However, VMS (vessel monitoring system) information will be used for raising if this data are demonstrated to be usable in the future. As for small longline vessel (10-20 GRT, coastal and small offshore), coverage rate is considered to be about 90% or more, based on the number of registered vessels.

Catch in weight in logsheet data is in processed weight, so that conversion factors by species are used to convert processed weight to whole weight.

Pole-and-line

The owners of pole-and-line fishing vessels larger than 20GRT are required to submit a logsheet on their operations and catch information to the Japanese government within 30 days after the cruise. The logsheets submitted to the government are forwarded to the NRIFSF, and are then compiled. Although the logsheet submission is mandate, the submission rate for the pole-and-line is not necessarily 100%. The coverage is likely to be around 80% in the beginning of the history of the pole-and-line logsheet system (1970's), but the submission rate was improved after that, to nearly 100% in 1990s. The coverage rate in Table 7 for the pole-and-line was calculated by

(number of the vessels which submitted logsheet) / (number of vessels which were registered).

Similar error check processes are also conducted. In case there is significant omission or errors, the NRISFS staff will contact to owner or other relevant person to get revised information.

Purse seine

The logbooks of 50 – 200 GRT class and greater than 200 GRT vessels were reported when fishermen caught tuna species. The coverage of the latter class was 100 % and the reported catch by species could be verified by comparing with the landing data, which were obtained from market receipts of three major unloading ports (Yaizu, Makurazaki, and Yamagawa).

4.2. Observer program

Two observer trips have been conducted in the WCP-CA, one for purse seine and the other for longline.

The observer program for purse seine has been implemented in the tropical Pacific Ocean since 1995. The detail of time and position at each operation, type of association, and the length frequencies samples were taken in each operation. Total number of trips conducted in the past is 38 for the past 14 years before 2008 (Table 8).

Three purse seine cruises were observed from September 2008 to February 2009 in tropical waters in the western Pacific Ocean (Table 9). Days spent for these cruises ranged from 37 to 42 days, which are typical durations for the Japanese purse seiner operated in the tropical waters. Afore-mentioned two cruises targeted on the free schools and yellowfin catch reached 50-55% of the total catch. This is relatively rare case for the Japanese purse seine. The last cruise indicated 45% of free school sets.

The observer program for longline in the WCP-CA started in 2008. The information of fishing boats, fishing operations and almost all the catches in each operation were identified and measured as much as observer can. Four cruises of offshore longline boats were observed (Table 10). The number of operations ranged from 17 to 70. The total number of catches which was recorded by each observer ranged from 542 to 4006 individuals. The largest number of catch was albacore, ranging from 317 to 1623 individuals. One of the trips was conducted in the waters off south east of Australia, targeting mainly southern bluefin tuna.

4.3. Port sampling

NRIFSF has collected size data (weight and/or length) of tunas and billfishes in major landing port of Japan. The following is a summary of size sampling, focusing on length measurements, carried out mainly in 2007 and

2008. Note that size measurement for tunas and billfishes has been carried out on board of research vessels and training vessels in addition to the 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 in 2003.

Size sampling

Length data of tunas and billfishes caught mainly nearshore of Japan have been collected in major landing ports in Japan. Such size measurements have been conducted for longline (excluding the distant-water longline), pole-and-line, troll and offshore purse seine. In 2007, the number of length data collected for bluefin, albacore, and skipjack were 37,000, 114,000 and 69,000, respectively.

Length data for tropical tunas (bigeye and yellowfin) have been collected in Kesen-numa (north part of Japan) and Kii-Katsuura (central Japan on Pacific coast) ports since 2005. In 2008, about 17,000 bigeye and 21,000 yellowfin were measured at the Kii-Katsuura port.

Length sampling for distant water purse seiners

In addition to the size samplings mentioned above, port sampling programs have been conducted to collect species composition data and length data for skipjack, yellowfin and bigeye caught by distant water purse seine fishery in Yaizu and Makurazaki ports located at central and southwest of Japan, respectively. We performed the port sampling 13 times in 2008 in Yaizu port and nine times at Makurazaki port. The annual total measurement number in 2008 was 23,200 fishes 8,200 and 3,500 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 2008 (Fig. 14) and there were three or four modes.

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

With respect to the research activities for tunas and billfishes, tagging studies for tropical tunas and sharks, bluefin tuna larval sampling, longline fishing and collection of gonad samples for albacore were conducted. Currently, a research cruise to investigate behavioral characteristics of juvenile bigeye is being conducted in the western Pacific with the participation of a research boat of Fisheries Agency, FRA tuna purse seiner and commercial purse seiner. Starting in September, two research cruises are also scheduled to investigate swordfish and bigeye habitat in relation to the oceanographic features in the North Pacific.

5.1. 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, collection of detailed movements around the anchored FADs, information on growth, the degree of exploitation by fishing gear in the area and so on. To date, 2,395 bigeye and 11,459 yellowfin of 21-133cm (mainly 30-60cm) in fork length were released with dart tag, of which 262 bigeye and 876 yellowfin tunas were recaptured (Table 11). After released from the waters around Okinawa and Amami Islands (24-30˚N, 123-132˚E), some fishes 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 tunas caught by pole and line fishing in the eastern offshore of Japan has been attempted since 2006. Last year, the first tagging release from the pole and line research boat was conducted in cooperation with the 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) bigeye tuna. A total of 1000 fish (of these, 892 bigeye: 49 -109 cm FL and 34 yellowfin: 48 -65 cm FL) were tagged and released in waters of eastern offshore of Japan (off central Honshu, 34-36˚N, 142-146˚E). Detail of this study is reported by Matsumoto and Okamoto (2008). This project is being continued and another research cruise was conducted this year (from 23rd June to 17th July). Also, pop-up tagging of yellowfin tuna was conducted in the area south of Kyushu (southern part of Japan, around 29°N, 130°E) between June and July 2008. A total of 10 yellowfin tuna (111-142 cm FL) were released (Matsumoto and Okamoto, 2008). Some of them popped off prematurely, and others didn't pop off.

Skipjack tagging

Four research/training pole-and-line vessels were involved in the skipjack tagging in 2008. The tagging was made widely in the area of north of equator in the Western Pacific ranged by 14˚N to 37˚N, from 138˚E to 154˚E. Total of 829 skipjack were released in 2008 and 57 skipjack were recovered to date. Most recapture was made in the second or third quarter and within 60 days after release.

In addition, skipjack tagging around Amami Island (Nansei Islands, around 28˚N, 130˚E) was conducted in 2009 (from April to May) using coastal pole-and-line vessels. Main objective of this study is to investigate migration to the Pacific coast of Japanese water (mainly western part of Japan) along Kuroshio Current. Dummy archival tags were also deployed on some individuals with the objective of reducing tag shedding and tagging mortality by improving tag attachment technique. A total of 1,327 individuals (mainly 40-45cm FL) were tagged and released which includes 30 dummy archival tagging.

Also, some skipjack were released during tropical tuna tagging mentioned above. In 2008, 150 and 74 fish were released in the Nansei Islands and off central Honshu, respectively. Of these, three and two individuals were recaptured to date, respectively.

Shark tagging

Shark tagging program has been conducted since 1996 to examine migration, population structure and life history parameters of pelagic sharks. In 2008, tags were attached to 1123 blue sharks, 15 bigeye threshers, 60 shortfin makos, 5 and 7 longfin makos. Twenty tags attached to blue sharks and 5shortfin makos were recovered and the tag recovery data indicated seasonal latitudinal migration of blue shark.

5.2. Research cruise conducted

Tuna larval sampling by Shunyo-Maru

Sampling cruises for larval Pacific bluefin tuna were conducted by R/V Shunyo-Maru in the spawning area during May and June 2008. The research cruises continued every year since 2004. A larval net which has 2 m diameter with 0.335 mm mesh size was used. Patches of bluefin tuna larvae were found and tracked with a drifter which was composed of GPS radio buoy and an 8 m drogue during May. Horizontal distribution during the early life history of bluefin tuna was investigated in the spawning area during June. Oceanographic observations were also carried out by using CTD and ADCP.

Albacore spawner sampling by Shoyo-Maru

To investigate albacore maturity and spawning in the subtropical waters in the North Pacific, samples of gonad and the others from adult albacore were collected by longlining during November to December in 2008. In addition, larvae of tunas were collected by ring net towing. It was observed that sex ratio of albacore was far from even and that female was only 17% of observed albacore.

5.3. Bycatch species related research

Mitigation studies for seabirds

Seabird avoidance effects of two types of tori-lines specified in WCPFC seabirds conservation and management measure, "1a) Tori line" (type A) and "1b) Tori line (light streamer)" (type B), were compared in longline fishing experiments in the western North Pacific, using commercial vessels of Kesen-numa offshore surface fleets (29 vessels) in April 2008 and R/V Taikei-maru No. 2 (196 GRT) in April - May 2009. In the experiments of Kesen-numa fleets, type A was used in 70 fishing operations, and type B in 190 fishing operations. The seabirds appeared during line-setting was higher for the operations with type B than type A (Fig.15; $p<0.0001$). The bias adjusted average number of seabird take per set was higher in type A than type B but the difference was not significant (Fig. 16). In the experiments of Taikei-maru No.2, the two types of tori-line were used alternately within each line-setting of total 18 operations in order to directly compare the performance of seabird avoidance between the two tori lines. The bias adjusted average number of seabird take was slightly higher for the operation with type A than type B (Fig. 17). There was no significant difference between the tori-line types. These results of these experiments are similar to the previous results (e.g. Yokota et al. 2008) indicate that both types of tori-lines had similar performance for seabird avoidance.

Mitigation studies for sea turtles

Captive experiments were conducted to test the potential of different types of hooks (elliptical hooks and circle hooks) and accessories attached to the hooks in reducing hooking mortality of sea turtles. Tetra-pins, tetrapod-shaped stainless frame (length of 1 pin: approximately 25mm) attached to a circle hook appeared to reduce hook ingestion compared to hooks without accessories.

Experiments of large circle hooks (Mutsu types 4.5; 4.8-sun, new type 4.5-sun) on catch rates of target species and sea turtles are on the way through scientific fishing surveys in the western North Pacific from May to July 2009, using R/V Taikei-maru No. 2. It is desirable to conduct further study on the effectiveness of various types of hooks.

Almost all sea turtles caught by shallow longlines were retrieved alive in our survey. Captive studies on post-hooking survival of 18 loggerhead turtles caught during the past scientific fishing operations have been conducted in the Yaeyama Station, Seikai National Fisheries Research Institute, Japan. So far, all hooked turtles survived for a prolonged time up to 4 years and some discharged the swallowed fishing hooks. The result indicates that live retrieval and release carefully is effective in improving the post-hooking survival of hooked sea turtles.

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 2006. 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 longline fisheries in the Pacific Ocean from 1971 to 2007. In the North Pacific, increasing trend of the CPUE was observed from 1990 to 2004. In the South Pacific, there was a slightly decreasing trend of the CPUE from 1998 to 2002, but after that a 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 Guardian Trusts (GGT) is implementing a program for distributing light type of tori lines for free to Japanese fishermen.

References

MAFFJ 2006-2008. Annual report of catch statistics on fishery and aquaculture, 2004-2006. 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.

Yokota, K., H. Minami, and M. Kiyota. Direct comparison of seabird avoidance effect between two types of tori-lines in experimental longline operations. WCPFC-SC4 EB-WP7. 10pp.

Table 1. Number of fishing vessels engaged in tuna fisheries in the WCPFC Convention Area by gear and size of vessel. Figures in parentheses indicate provisional data. NA indicates not available.

Longline

		2004	2005	2006	2007	2008
0-10 ton	(Coastal LL)	287	292	311	NA	NA
10-20 ton	(Coastal and small offshore LL)	311	315	336	317	(317)
20-120 ton	(Offshore LL)	100	80	77	74	(74)
120+ ton	(Distant water LL)	211	178	167	142	(142)
	Training vessel	35	33	36	35	(35)
Total		944	898	927	NA	NA

Pole-and-line

	2004	2005	2006	2007	2008
20-50 ton	1	1	1	1	(1)
50-200 ton	92	92	86	80	(70)
200+ ton	44	45	36	35	(35)
Total	137	138	123	116	(106)

Purse Seine

	2004	2005	2006	2007	2008
50-200 ton	30	31	27	34	(36)
200-500 ton	35	34	34	34	(34)
500+ ton	0	0	1	1	(1)
Total	65	65	62	69	(71)

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.

	2004	2005	2006	2007	2008
Number of hooks	106	91	87	95	(95)
Pacific bluefin	238	120	73	92	(92)
Albacore	7,944	9,076	7,568	7,427	(7,427)
Bigeye	20,725	13,842	14,311	15,491	(15,491)
Yellowfin	9,441	9,116	9,631	10,077	(10,077)
Swordfish	5,566	5,395	6,075	6,114	(6,114)
Striped marlin	688	457	457	397	(397)
Blue marlin	1,949	1,723	1,634	1,617	(1,617)
Black marlin	55	65	67	77	(77)
Sailfish	41	100	109	89	(89)
Shortbill spearfish	55	67	114	69	(69)
Total	46,463	39,840	39,964	41,358	(41,358)

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.

	2004	2005	2006	2007	2008
Number of fishing day	20,420	20,643	16,770	16,154	(16,154)
Number of pole	386,899	385,525	310,725	305,431	(305,431)
Skipjack	98,138	128,703	93,744	77,374	(77,374)
Yellowfin	2,285	3,140	2,690	2,188	(2,188)
Bigeye	3,341	1,283	3,745	1,679	(1,679)
Albacore	34,886	16,474	16,339	36,377	(36,377)
Pacific bluefin	331	555	58	25	(25)
Total	138,980	150,155	116,575	117,642	(117,642)

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.

	2004	2005	2006	2007	2008
Number of fishing day	8,882	8,658	7,879	8,350	7,261
Skipjack	174,397	218,730	216,782	227,982	185,450
Yellowfin	22,692	26,286	28,237	25,304	29,094
Bigeye	4,585	4,700	4,618	5,384	5,157
Pacific bluefin	7,354	11,234	7,721	5,146	8,086
Albacore	7,175	908	322	5,709	650
Total	216,203	261,858	257,680	269,525	228,437

Table 5. Japanese catches (mt) for miscellaneous coastal fisheries by species and gear in the WCPFC Convention Area. Figures in parentheses indicate provisional data.

Gear	Species	2004	2005	2006	2007	2008
Coastal and small offshore longline	Skipjack	21	27	13	8	(8)
	Yellowfin	5,768	5,676	5,028	4,875	(4,875)
	Bigeye	8,523	9,179	12,083	11,305	(11,305)
	Pacific bluefin	1,616	1,818	1,058	2,225	(2,225)
	Albacore	12,960	15,253	16,593	18,328	(18,328)
	Swordfish	1,505	1,289	1,504	1,978	(1,978)
	Striped marlin	1,000	668	539	846	(846)
	Blue marlin + Black marlin	1,444	1,129	1,116	1,183	(1,183)
	Total	32,835	35,038	37,933	40,747	(40,747)
Coastal pole-and-line	Skipjack	9,990	7,363	6,213	8,026	(8,026)
	Yellowfin	755	507	1,650	1,189	(1,189)
	Bigeye	52	51	75	173	(173)
	Pacific bluefin	123	372	47	233	(63)
	Albacore	169	48	78	104	(104)
	Total	11,089	8,341	8,063	9,725	(9,555)
Coastal purse seine	Skipjack	716	296	564	715	(715)
	Yellowfin	8	153	23	18	(18)
	Bigeye	6	10	52	12	(12)
	Pacific bluefin	2,577	7,390	3,272	2,841	(6,299)
	Albacore	18	6	28	3	(3)
	Total	3,325	7,855	3,939	3,589	(7,047)
Troll	Skipjack	14,802	5,971	3,624	3,249	(3,249)
	Yellowfin	2,294	2,094	2,262	2,297	(2,297)
	Bigeye	83	135	101	124	(124)
	Pacific bluefin	2,182	3,406	1,544	2,385	(3,229)
	Albacore	772	665	460	519	(519)
	Total	20,133	12,271	7,991	8,574	(9,418)
Gillnet	Skipjack	721	707	311	480	(480)
	Yellowfin	10	13	13	16	(16)
	Bigeye	5	6	11	3	(3)
	Albacore	61	154	221	226	(226)
	Total	797	880	556	725	(725)
Setnet	Skipjack	224	711	330	535	(535)
	Yellowfin	25	30	18	53	(53)
	Bigeye	2	4	0	1	(1)
	Albacore	30	97	55	30	(30)
	Total	281	842	403	619	(619)

Table 6. Japanese catches (mt) for tropical tuna species by gear in the WCPFC Convention Area. Figures in parentheses indicate provisional data. LL: longline, PL: pole-and-line, PS: purse seine.

		2004	2005	2006	2007	2008
Skipjack	Total	299,370	362,841	321,827	318,646	(276,114)
	Distant water and Offshore LL	51	73	61	42	(42)
	Distant water and Offshore PL	98,138	128,703	93,744	77,374	(77,374)
	Tuna PS	174,397	218,730	216,782	227,982	(185,450)
	Coastal and small offshore LL	21	27	13	8	(8)
	Coastal PL	9,990	7,363	6,213	8,026	(8,026)
	Coastal PS	716	296	564	715	(715)
	Gill net	721	707	311	480	(480)
	Troll	14,802	5,971	3,624	3,249	(3,249)
	Set net	224	711	330	535	(535)
	Unclassified	311	260	186	235	(235)
Yellowfin	Total	43,542	47,309	49,814	46,311	(50,101)
	Distant water and Offshore LL	9,441	9,116	9,631	10,077	(10,077)
	Distant water and Offshore PL	2,285	3,140	2,690	2,188	(2,188)
	Tuna PS	22,692	26,286	28,237	25,304	29,094
	Coastal and small offshore LL	5,768	5,676	5,028	4,875	(4,875)
	Coastal PL	755	507	1,650	1,189	(1,189)
	Coastal PS	8	153	23	18	(18)
	Gill net	10	13	13	16	(16)
	Troll	2,294	2,094	2,262	2,297	(2,297)
	Set net	25	30	18	53	(53)
	Unclassified	265	295	263	295	(295)
Bigeye	Total	37,341	29,306	35,035	34,236	(34,008)
	Distant water and Offshore LL	20,725	13,842	14,311	15,491	(15,491)
	Distant water and Offshore PL	3,341	1,283	3,745	1,679	(1,679)
	Tuna PS	4,585	4,700	4,618	5,384	5,157
	Coastal and small offshore LL	8,523	9,179	12,083	11,305	(11,305)
	Coastal PL	52	51	75	173	(173)
	Coastal PS	6	10	52	12	(12)
	Gill net	5	6	11	3	(3)
	Troll	83	135	101	124	(124)
	Set net	2	4	0	1	(1)
	Unclassified	19	96	39	64	(64)

Table 7. Coverage rate of logbook for the longline, pole-and-line and Purse seine fisheries. The calculation methods among fishery are not the same. NA indicates not available.

Type of fishery	2004	2005	2006	2007	2008
Distant water longline	92%	91%	91%	80%	NA
Offshore longline	95%	92%	95%	96%	NA
Small offshore longline	NA	NA	NA	NA	NA
Coastal longline	NA	NA	NA	NA	NA
Offshore pole-and-line (20-120 GRT)	99%	100%	100%	100%	100%
Distant water pole-and-line (over 120 GRT)	100%	100%	100%	100%	100%
Purse seine (>200GRT)	100%	100%	100%	100%	100%

Table 8. Number of cruises for the purse seine observer program in the tropical waters of western central Pacific.

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of cruises	2	4	3	4	3	3	3	3	3	1	1	2	3	3	38

Table 9. Information of observer programs for Japanese purse seiner operated in the tropical waters

Cruise number	1	2	3
Area of opretaion	5° N - 1° S 153 - 175 °E	5° N - 0° N 156 - 175°E	4° N - 0° S 145 - 149°E
Departure port - Return port	Shimizu - Yaizu	Yaizu - Yaizu	Yaizu - Yamakgawa
Date of departure	2008/9/15	2008/9/22	2008/12/30
Date of return	2008/10/25	2008/11/2	2009/2/4
Days of cruise	41	42	37
Days of fishing	25	25	23
Number of set	35	34	40
free school	30	31	18
associated school	5	3	22
Total catch (metric tonn)	719.3	695.0	791.4
skipjack	359.3	310.0	734.6
yellowfin	360.0	385.0	54.1
bigeye	0.0	0.0	2.7

Table 10. Number of operations and catch number for longline observer program in the western central Pacific in 2008.

Cruise number	1	2	3	4
Number of operations	21	17	18	70
Number of catch				
Albacore	568	317	530	1,623
Yellowfin tuna	66	4	132	18
Bigeye tuna	25	69	49	389
Southern bluefin tuna	0	0	0	297
Pacific bluefin tuna	0	0	0	1
Skipjack tuna	49	2	32	1
Butterfly tuna	0	0	0	2
Sailfish	2	0	0	0
Blue marlin	34	1	23	0
Spearfish	4	1	11	1
Striped marlin	0	4	25	7
Swordfish	4	1	0	58
Unidentified fishes	0	0	0	4
Lancetfishes	81	20	2	229
Longnose lancetfish	1	33	34	0
Opah	8	7	4	94
Crestfish	1	0	0	1
Pomfrets	10	6	0	31
Atlantic pomflet	0	0	0	3
Bigscale pomfret	12	0	0	0
Rough pomfret	0	0	0	20
Dolphinfish	1	4	18	0
Snake mackerel	0	4	1	1
Escoler	23	53	6	215
Oilfish	0	0	0	30
Wahoo	29	1	17	0
Rudderfishes	0	0	0	1
Ocean sunfish	1	1	0	228
Slender mola	0	0	7	0
Thresher sharks	0	0	0	11
Bigeye thresher	1	0	0	0
Shortfin mako	0	0	0	47
Salmon shark	0	0	0	1
Porbeagle	0	0	0	16
Oceanic whitetip shark	1	0	0	0
Blue shark	33	7	5	379
Sting ray	0	6	1	218
Albatrosses	0	0	0	77
Southern giant petrel	0	0	0	2
Loggerhead turtle	0	1	0	0
Unidentified organisms	0	0	0	1

Table 11. 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	Percentage of recapture	Release	Recapture	Percentage of recapture	Release	Recapture	Percentage of recapture
2000	442	99	22.4%	1,174	164	14.0%	1,616	263	16.3%
2001	374	37	9.9%	1,435	91	6.3%	1,809	128	7.1%
2002	170	15	8.8%	970	53	5.5%	1,140	68	6.0%
2003	365	40	11.0%	1,580	240	15.2%	1,945	280	14.4%
2004	188	15	8.0%	1,463	86	5.9%	1,651	101	6.1%
2005	265	18	6.8%	1,354	84	6.2%	1,619	102	6.3%
2006	279	8	2.9%	1,179	38	3.2%	1,458	46	3.2%
2007	149	20	13.4%	1,121	57	5.1%	1,270	77	6.1%
2008	163	10	6.1%	1,183	63	5.3%	1,346	73	5.4%
Total	2,395	262	10.9%	11,459	876	7.6%	13,854	1,138	8.2%

Archival tag

Species	**Bigeye tuna**			**Yellowfin tuna**			**Total**		
Year	Release	Recapture	Percentage of recapture	Release	Recapture	Percentage of recapture	Release	Recapture	Percentage of recapture
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%
2008	12	1	8.3%	6	1	16.7%	18	2	11.1%
Total	137	24	17.5%	86	6	7.0%	223	30	13.5%

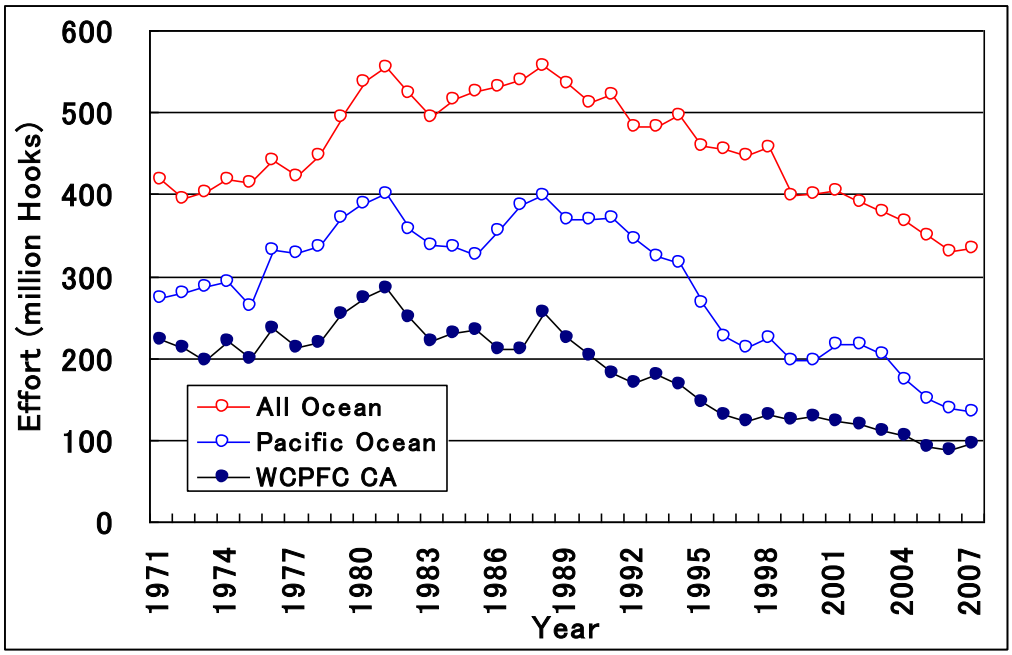


Fig. 1. Historical change in fishing effort of the Japanese longline fishery (>20GRT) in the WCPFC Convention Area.

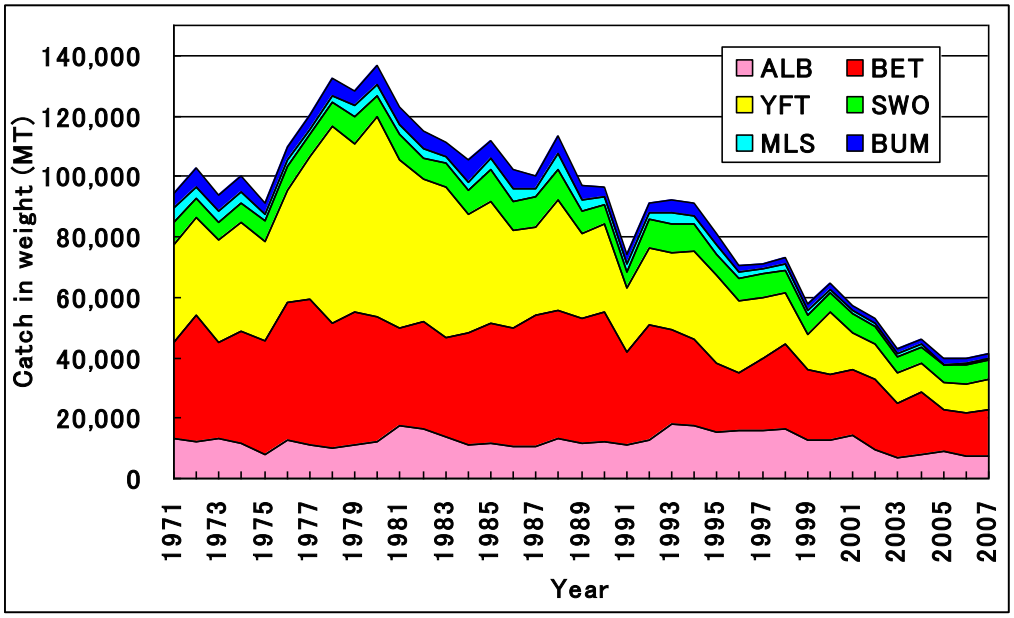


Fig. 2. Historical change of catches for major species for the Japanese longline fishery (>20GRT) in the WCPFC Convention Area.

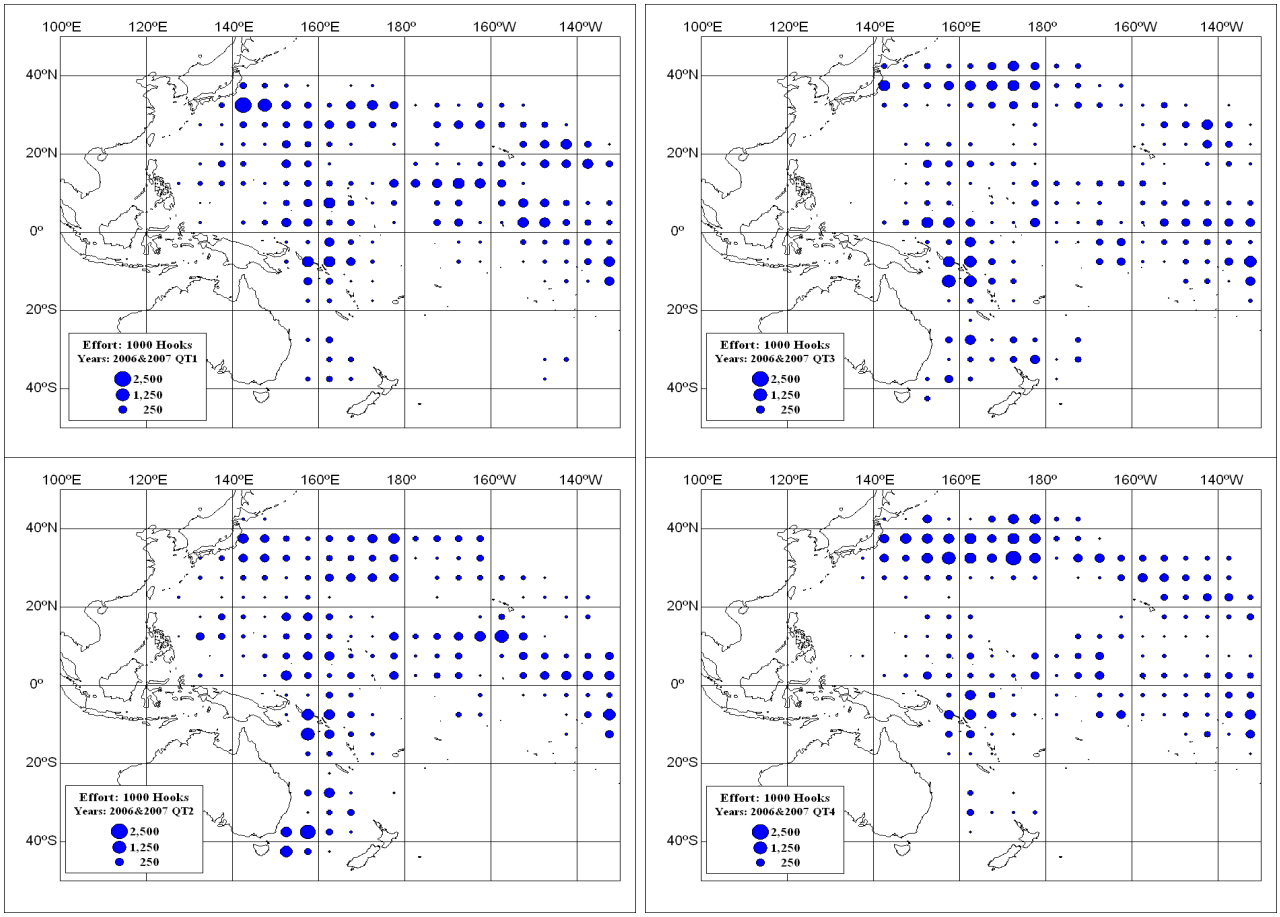


Fig. 3. Quarterly distribution of fishing effort for the Japanese offshore and distant water longline fisheries in the western and central Pacific Ocean in average of 2006-2007.

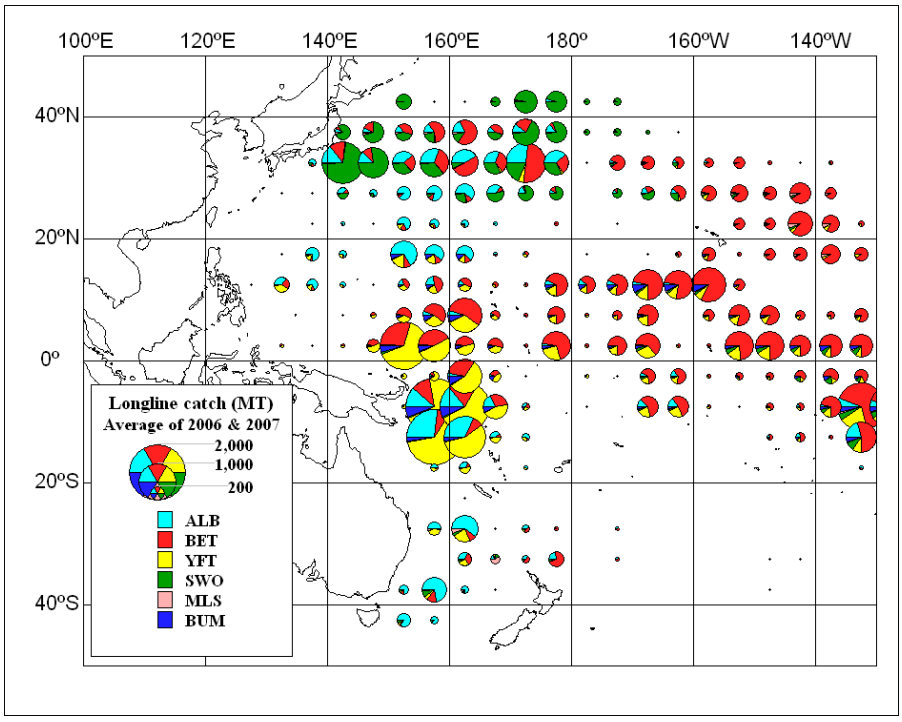


Fig. 4. Distributions of offshore and distant water longline catch (in weight) by species in average of 2006-2007 for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BUM: blue marlin).

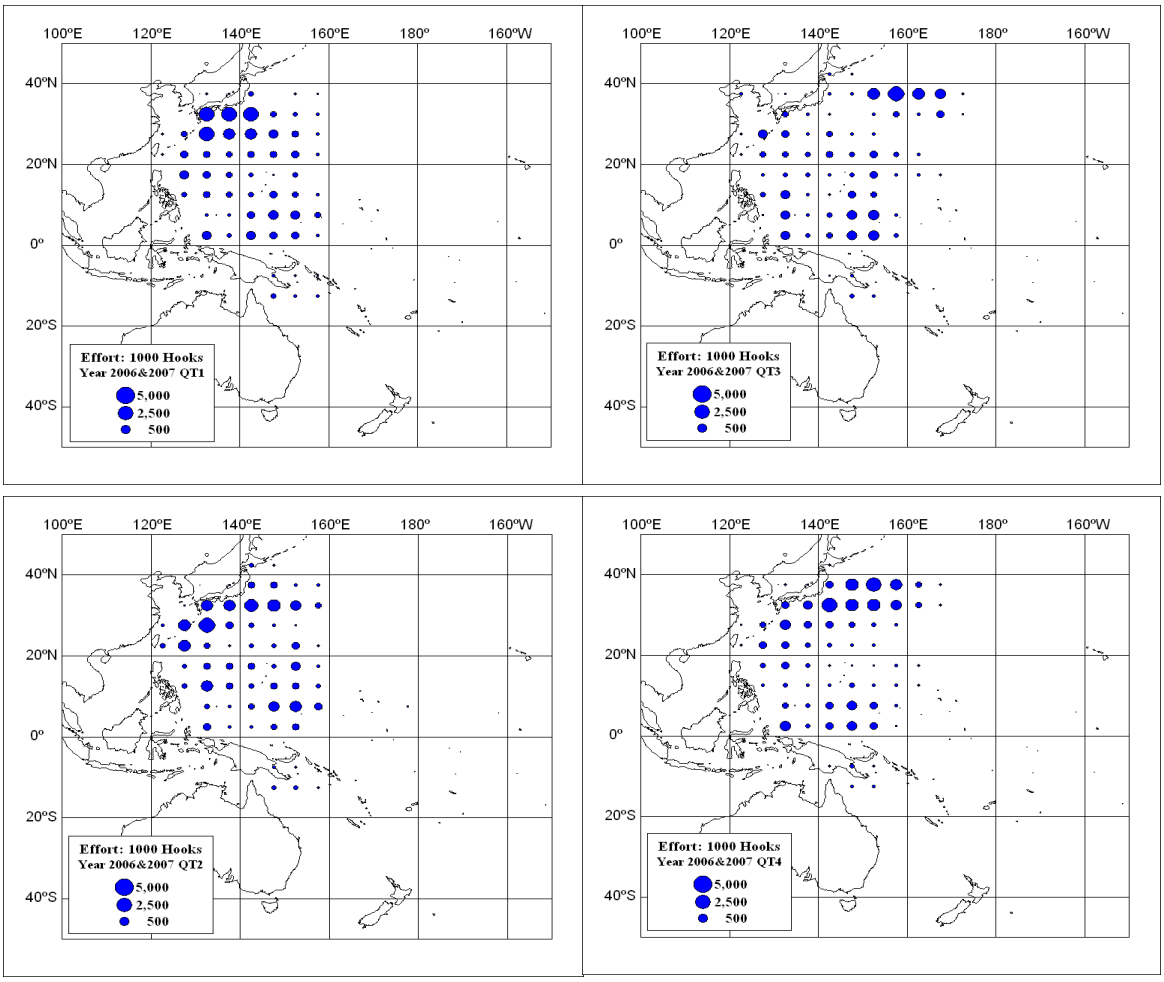


Fig. 5. Quarterly distribution of fishing effort for the Japanese small offshore longline fisheries (less than 20 GRT) in the western and central Pacific Ocean in average of 2006-2007.

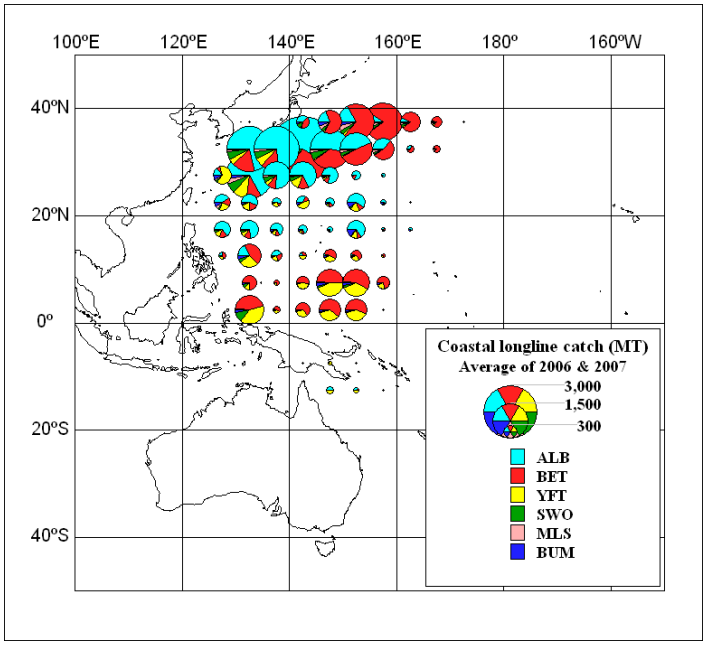
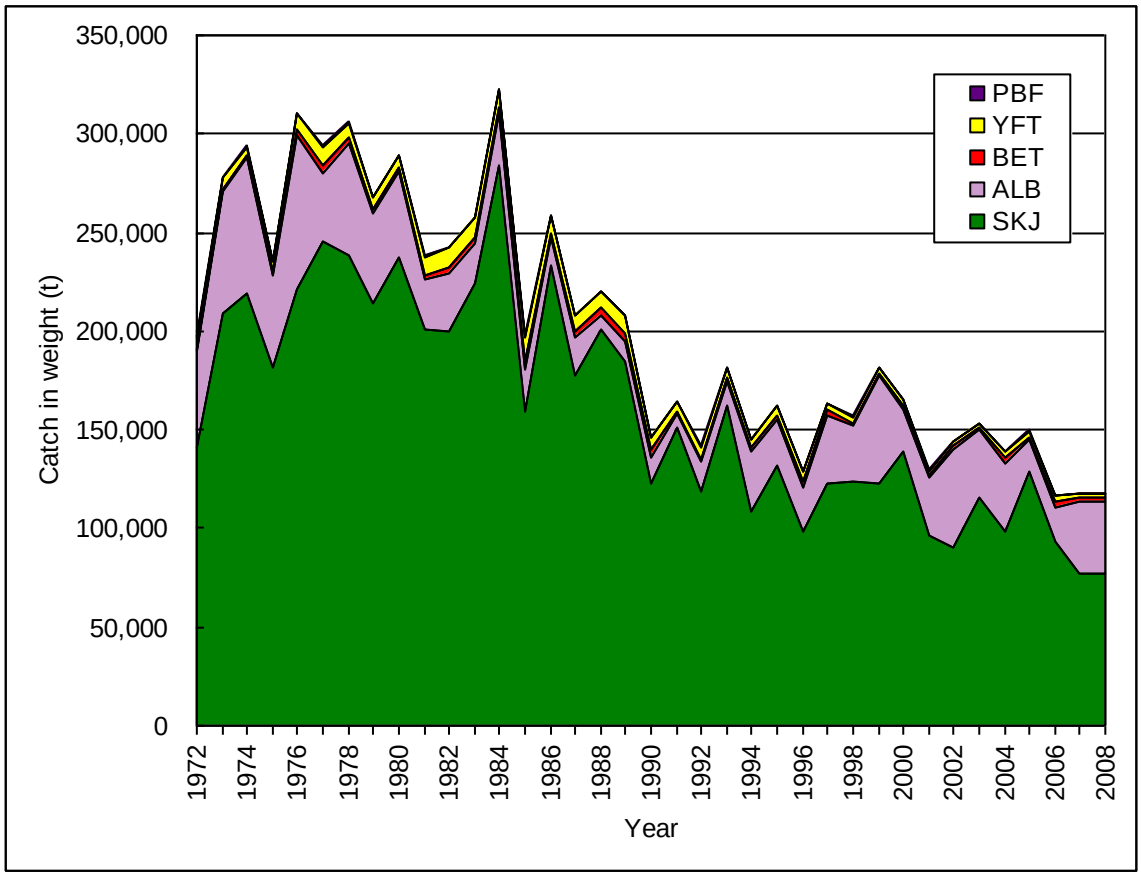


Fig. 6. Distributions of small offshore longline catch (in weight) by species in average of 2006-2007 for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BUM: blue marlin).



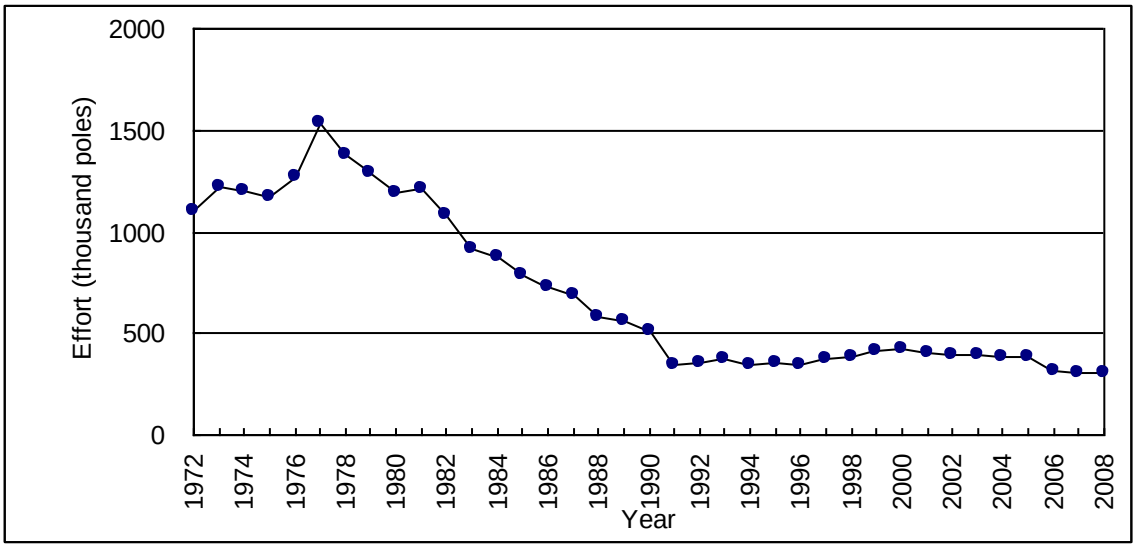


Fig. 7. Historical change of fishing effort and catches by species for the Japanese pole-and-line fishery (>20GRT) in the WCPFC Convention Area. Values in 2008 are provisional.

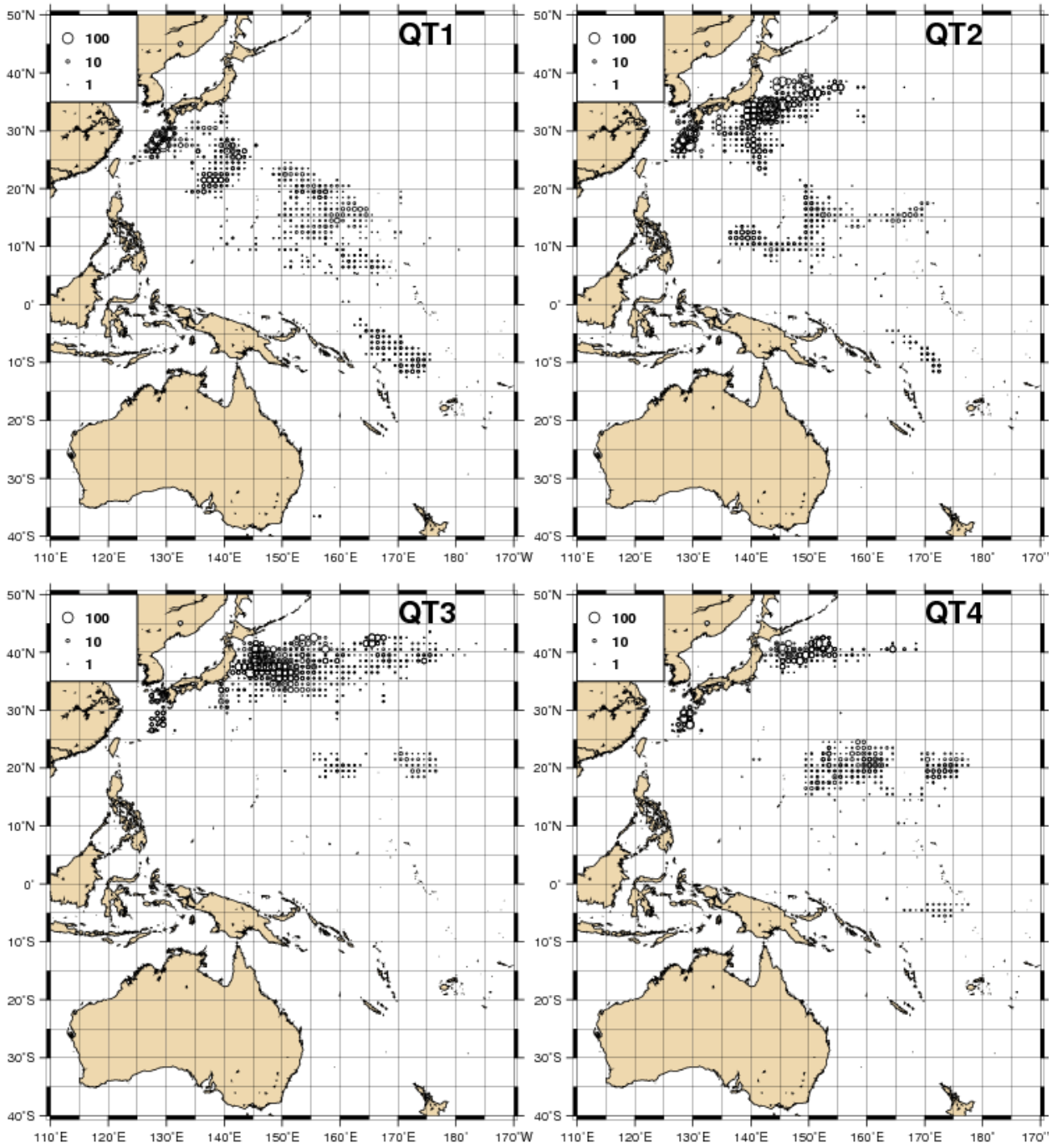


Fig. 8. Quarterly distribution of fishing effort for the Japanese pole-and-line fishery (offshore and distant water licences) in the Pacific Ocean in average of 2006-2007.

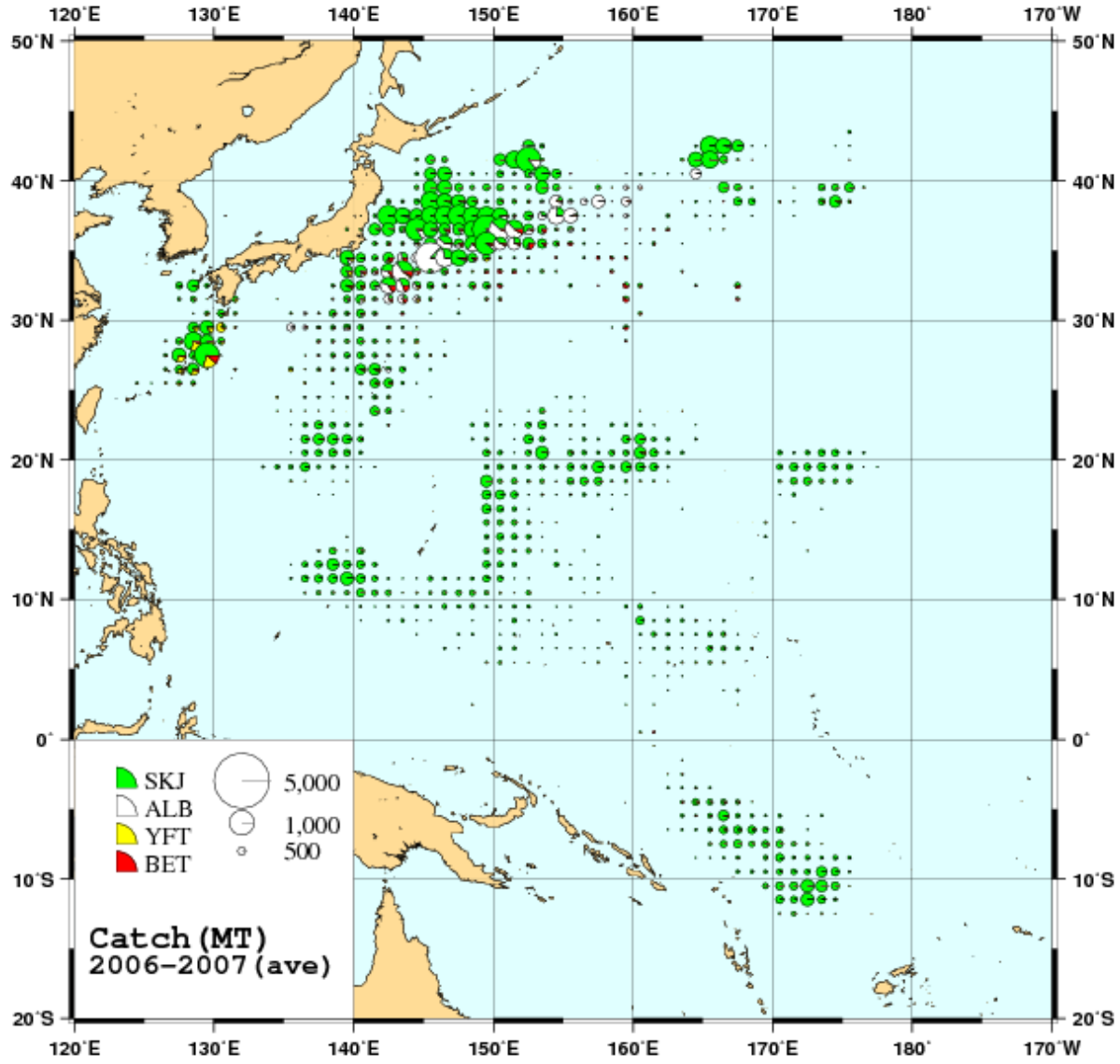
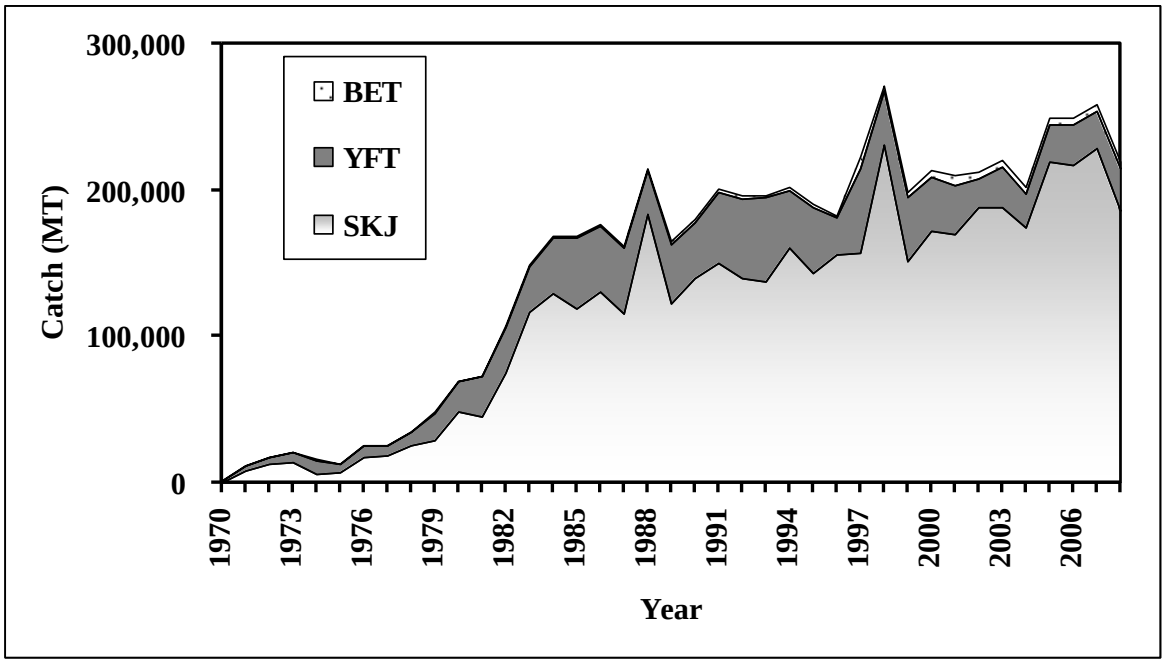


Fig. 9. Distribution of catch and its species composition for the Japanese offshore and distant water pole-and-line fishery in average of 2006-2007.



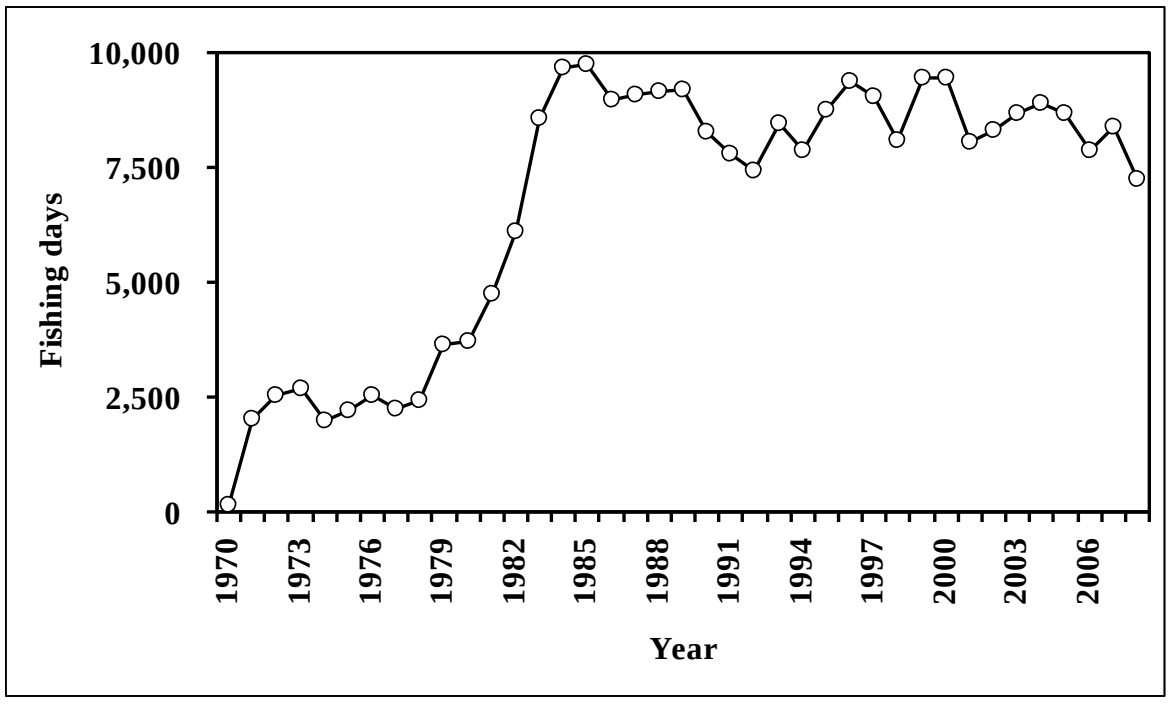


Fig. 10. Trends of fishing effort and catches by species for the Japanese tuna purse seine fishery in the WCPFC Convention Area.

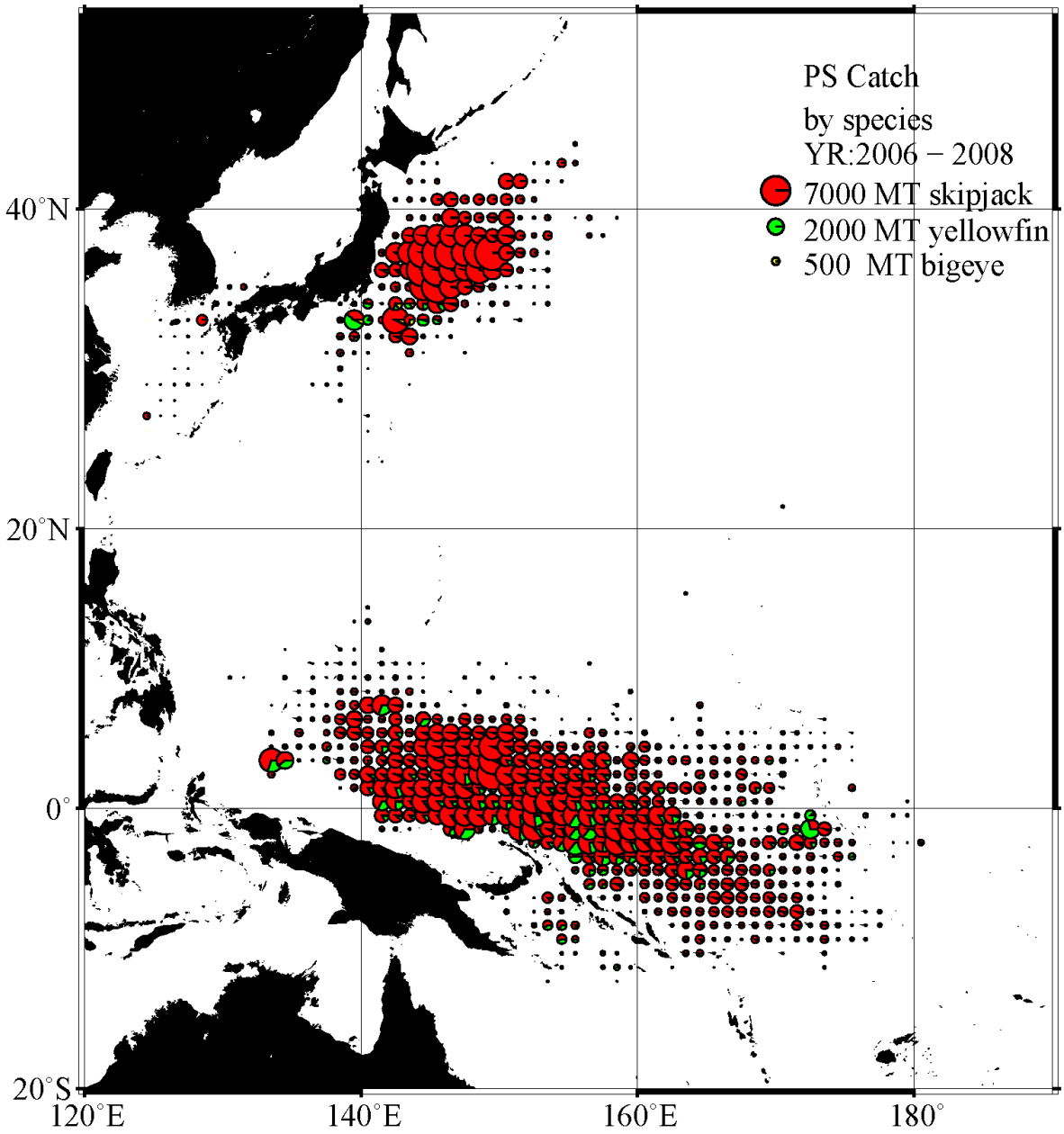


Fig. 11. Distribution of tuna purse seine catch (mt) by species for tropical tuna species (bigeye, yellowfin and skipjack) combined for 2006- 2008.

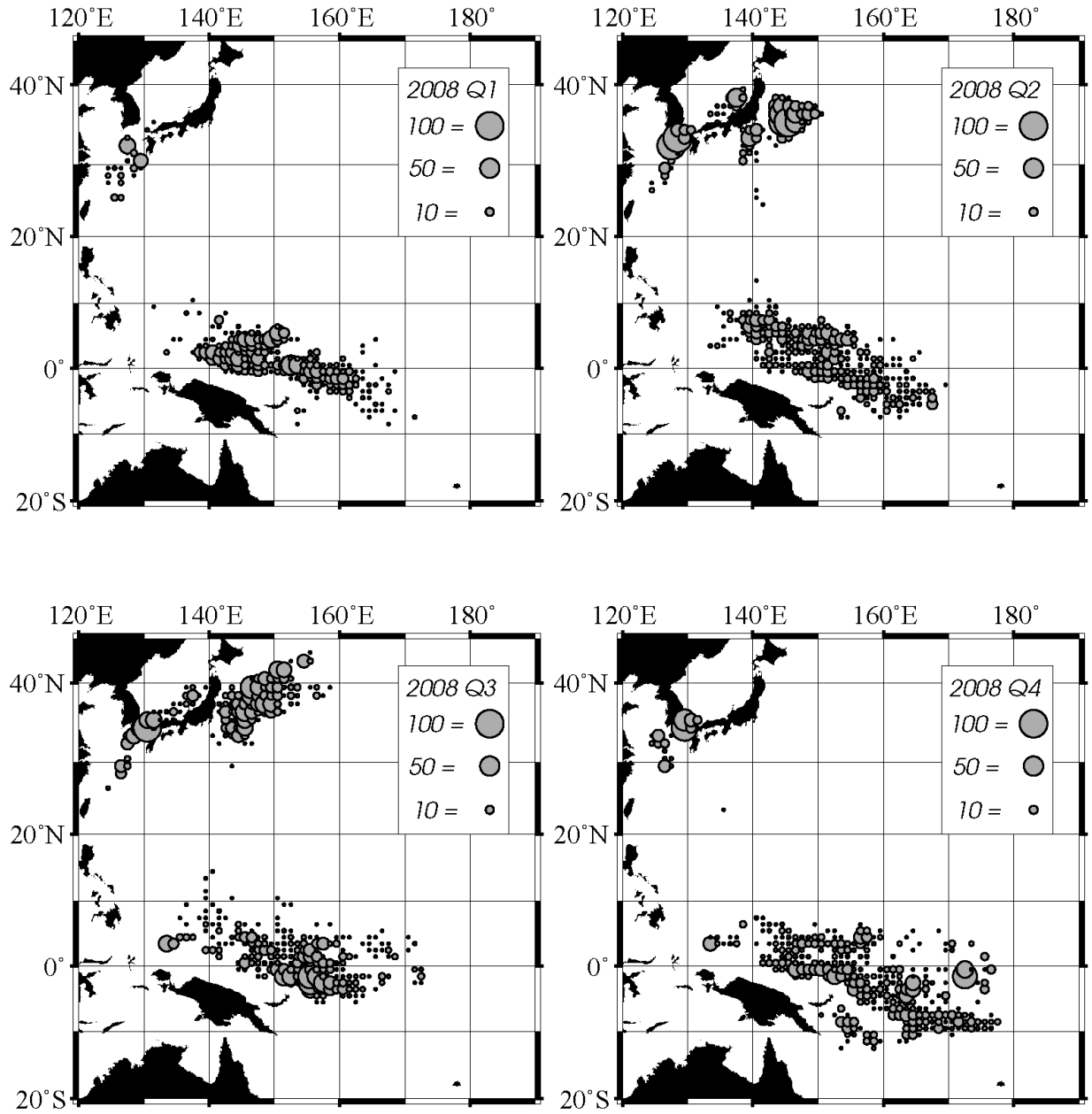


Fig. 12. Quarterly distributions of fishing effort (number of set) for the Japanese tuna purse seine fishery in the Pacific Ocean in 2008.

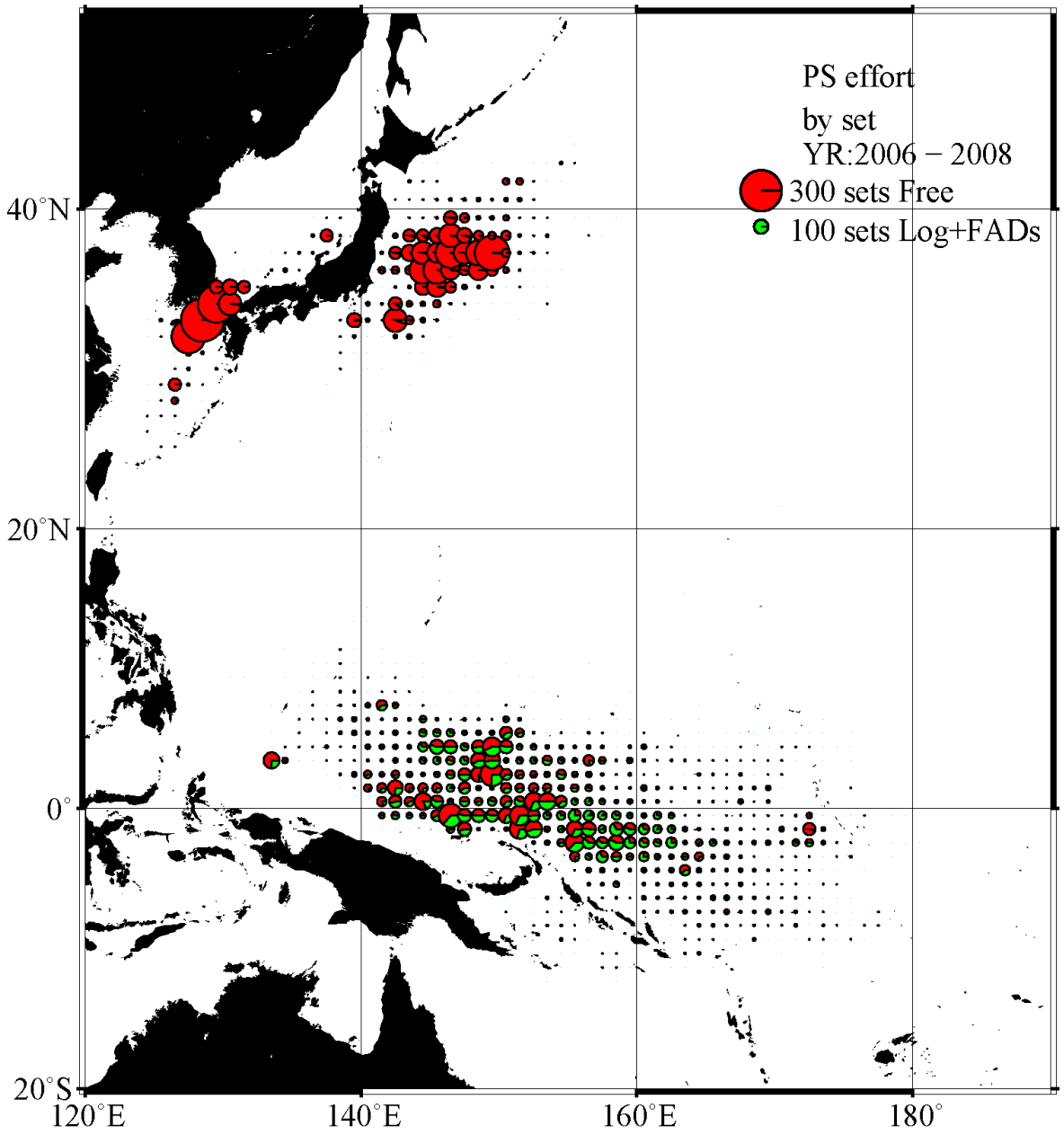


Fig. 13. Distribution of sets by type of school for 2006-2008 deployed by the tuna purse seine fishery by Japan.

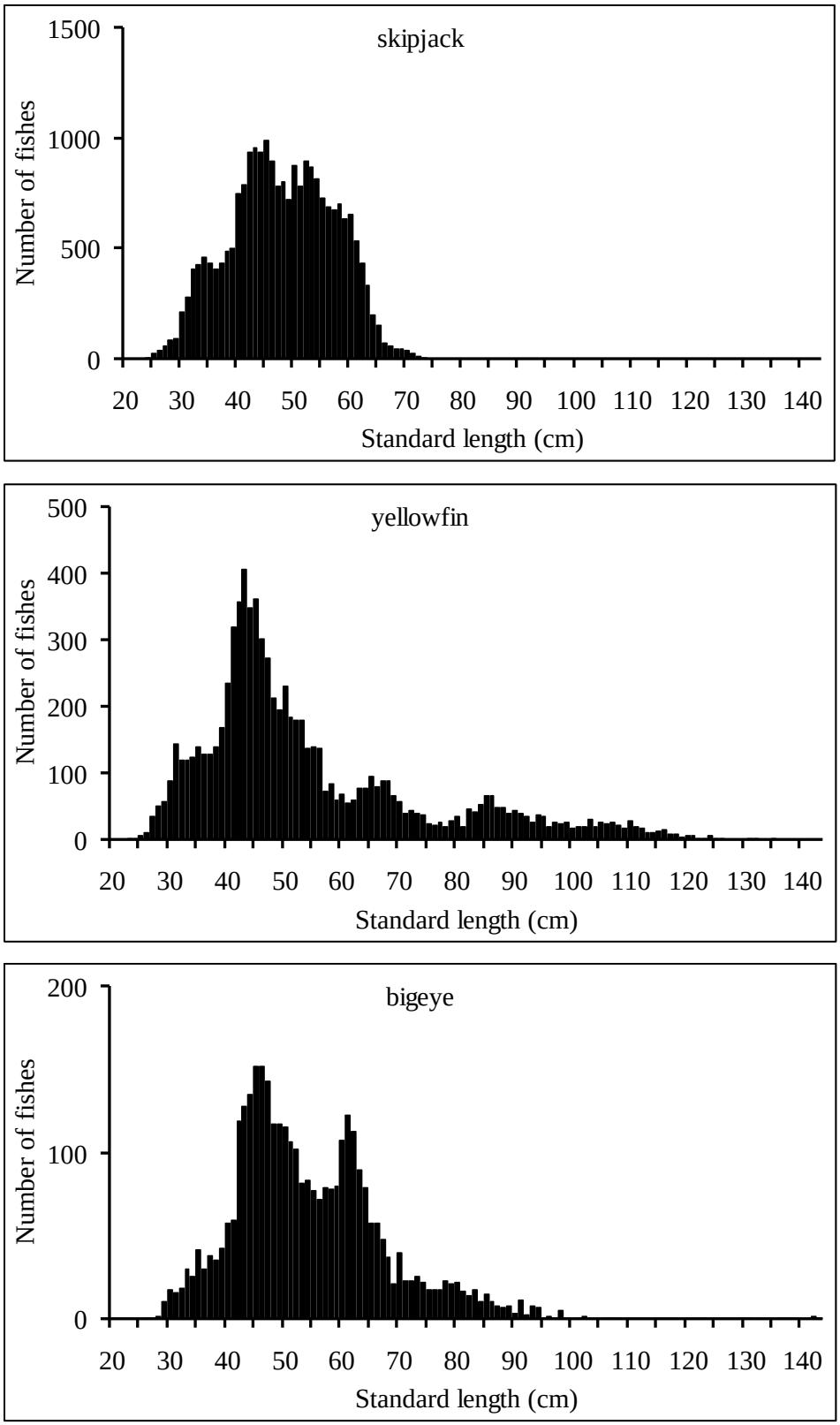


Fig. 14. Annual length frequency distribution of purse seine-caught fish in equatorial waters in 2008.

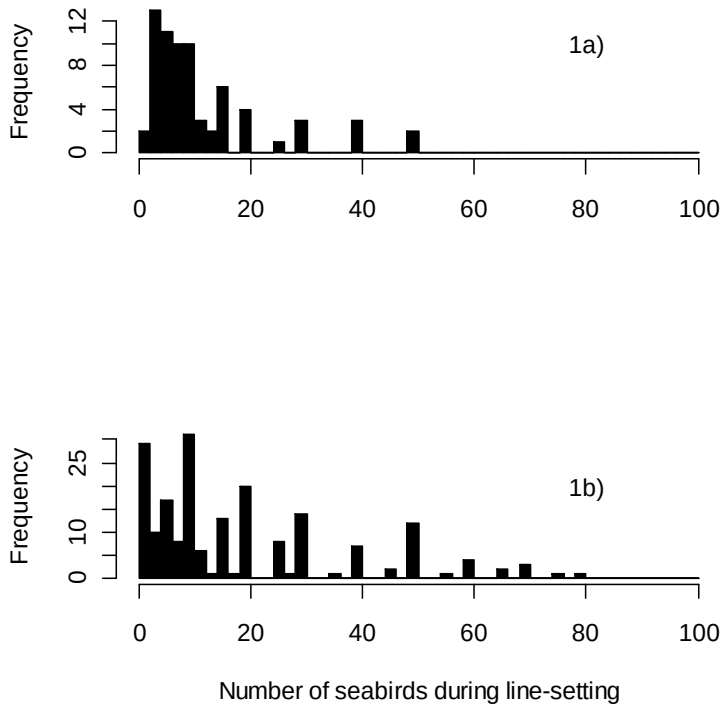


Fig. 15. Experiments of tori-line using Kesen-numa fleets in April 2008. Histograms of maximum number of seabirds appeared during a fishing.

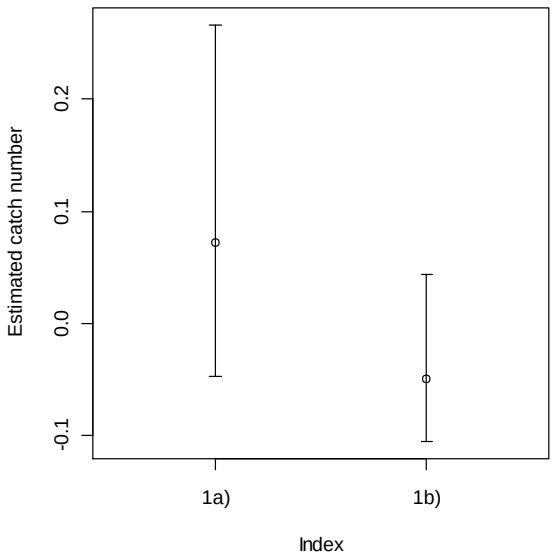


Fig. 16. Experiments of tori-line using Kesen-numa fleets in April 2008. Catch number of seabird and the 95% confidential interval in each tori-line was estimated by generalized linear mixed model. The estimates are shown as difference from mean catch number

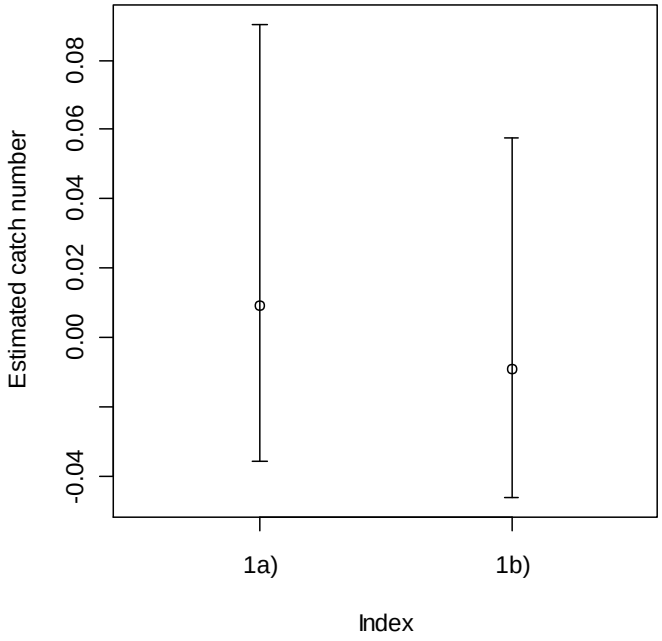


Fig. 17. Experiments of tori-line using a research vessel (Taikei-maru No. 2) in April - May 2009. Catch number of seabird and the 95% confidential interval in each tori-line was estimated by generalized linear mixed model. The estimates are shown as difference from mean catch number.

Appendix Table 1. Catches (mt) for bigeye, yellowfin, blue marlin, black marlin and skipjack in the portion of the WCPFC Convention Area east of the 150˚ meridian of west longitude caught by distant-water and offshore longlin fisheries.

Year	Bigeye	Yellowfin	Blue marlin	Black marlin	Skipjack
2004	2479	844	307	5	4
2005	1457	344	254	2	3
2006	1616	472	109	3	4
2007	1766	407	167	1	9
2008	1766	407	167	1	9

Appendix Table 2. Catches (mt) for Pacific bluefin, albacore, swordfish and striped marlin in the Pacific Ocean north of the Equator, the Pacific Ocean south of the Equator, the WCPFC Convention Area north of the Equator and the WCPFC Convention Area south of the Equator. Figures in 2008 are provisional.

Pacific bluefin tuna [Pacific, north of the Equator]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	1616	231	123	9	2577	4844	93	2182	896	421
2005	1818	107	372	177	7390	4061	135	3406	2182	413
2006	1058	63	47	61	3272	3962	313	1544	1421	464
2007	2225	84	233	2	2841	3058	144	2385	1503	1065
2008	2225	84	63	1	6299	2954	276	3229	3265	917

Pacific bluefin tuna [Pacific, south of the Equator]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	0	9	0	0	0	0	0	0	0	0
2005	0	14	0	0	0	0	0	0	0	0
2006	0	11	0	0	0	0	0	0	0	0
2007	0	8	0	0	0	0	0	0	0	0
2008	0	8	0	0	0	0	0	0	0	0

Pacific bluefin tuna [WCPFC, north of the Equator]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	1616	230	123	9	2577	4844	93	2182	896	421
2005	1818	107	372	177	7390	4061	135	3406	2182	413
2006	1058	63	47	61	3272	3962	313	1544	1421	464
2007	2225	84	233	2	2841	3058	144	2385	1503	1065
2008	2225	84	63	1	6299	2954	276	3229	3265	917

Pacific bluefin tuna [WCPFC, south of the Equator]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	0	8	0	0	0	0	0	0	0	0
2005	0	14	0	0	0	0	0	0	0	0
2006	0	10	0	0	0	0	0	0	0	0
2007	0	8	0	0	0	0	0	0	0	0
2008	0	8	0	0	0	0	0	0	0	0

Pacific bluefin tuna [WCPFC, east of the 150 degree meridian of west longitude]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0

Appendix Table 2. (Continued)

Albacore [Pacific, north of the Equator]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	12960	4381	169	32086	18	7182	61	772	30	54
2005	15208	5212	48	16085	6	844	154	665	97	234
2006	16452	4575	78	15322	28	336	221	460	55	42
2007	18299	4087	104	37664	3	5679	226	519	30	44
2008	18299	4087	104	19473	3	1030	226	519	30	44

Albacore [Pacific, sorth of the Equator]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	0	5633	0	104	0	0	0	0	0	0
2005	45	6473	0	17	0	0	0	0	0	0
2006	141	5046	0	6	0	0	0	0	0	0
2007	29	5083	0	0	0	0	0	0	0	0
2008	29	5083	0	0	0	0	0	0	0	0

Albacore [WCPFC, north of the Equator]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	12960	4362	169	32086	18	7182	61	772	30	54
2005	15208	5189	48	16085	6	844	154	665	97	234
2006	16452	4564	78	15322	28	336	221	460	55	42
2007	18299	4080	104	37664	3	5679	226	519	30	44
2008	18299	4080	104	19473	3	1030	226	519	30	44

Albacore [WCPFC, south of the Equator]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	0	3620	0	104	0	0	0	0	0	0
2005	45	4033	0	17	0	0	0	0	0	0
2006	141	3083	0	6	0	0	0	0	0	0
2007	29	3422	0	0	0	0	0	0	0	0
2008	29	3422	0	0	0	0	0	0	0	0

Albacore [WCPFC, east of the 150 degree meridian of west longitude]

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2004	0	280	0	0	0	0	0	0	0	0
2005	0	187	0	0	0	0	0	0	0	0
2006	0	238	0	0	0	0	0	0	0	0
2007	0	332	0	0	0	0	0	0	0	0
2008	0	332	0	0	0	0	0	0	0	0

Appendix Table 2. (Continued)

Swordfish [Pacific, north of the Equator]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	1505	5350	1062	20	4	243
2005	1289	5334	956	13	3	517
2006	1504	6105	796	14	5	576
2007	1978	5885	829	14	2	478
2008	1978	5885	829	14	2	478

Swordfish [Pacific, south of the Equator]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	0	2228	0	0	0	0
2005	0	1662	0	0	0	0
2006	0	1436	0	0	0	0
2007	0	1687	0	0	0	0
2008	0	1687	0	0	0	0

Swordfish [WCPFC, north of the Equator]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	1505	4896	1062	20	4	243
2005	1289	4952	956	13	3	517
2006	1504	5704	796	14	5	576
2007	1978	5679	829	14	2	478
2008	1978	5679	829	14	2	478

Swordfish [WCPFC, south of the Equator]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	0	670	0	0	0	0
2005	0	444	0	0	0	0
2006	0	371	0	0	0	0
2007	0	435	0	0	0	0
2008	0	435	0	0	0	0

Swordfish [WCPFC, east of the 150 degree meridian of west longitude]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	0	279	0	0	0	0
2005	0	156	0	0	0	0
2006	0	156	0	0	0	0
2007	0	179	0	0	0	0
2008	0	179	0	0	0	0

Appendix Table 2. (Continued)

Striped Marlin [Pacific, north of the Equator]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	1000	620	1339	17	23	51
2005	668	503	1214	20	28	51
2006	538	545	1190	11	30	54
2007	846	276	970	35	28	28
2008	846	276	970	35	28	28

Striped Marlin [Pacific, south of the Equator]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	0	681	0	0	0	0
2005	0	638	0	0	0	0
2006	0	621	0	0	0	0
2007	0	625	0	0	0	0
2008	0	625	0	0	0	0

Striped Marlin [WCPFC, north of the Equator]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	1000	429	1339	17	23	51
2005	668	305	1214	20	28	51
2006	538	295	1190	11	30	54
2007	846	245	970	35	28	28
2008	846	245	970	35	28	28

Striped Marlin [WCPFC, south of the Equator]

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	0	259	0	0	0	0
2005	0	153	0	0	0	0
2006	0	162	0	0	0	0
2007	0	152	0	0	0	0
2008	0	152	0	0	0	0

Striped marlin [WCPFC, east of the 150 degree meridian of west longitude

Year	LL	LL	Gillnet	Troll	Setnet	Others
	Coastal	Offshore and distant-water				
2004	0	36	0	0	0	0
2005	0	23	0	0	0	0
2006	0	24	0	0	0	0
2007	0	27	0	0	0	0
2008	0	27	0	0	0	0