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

National Tuna Fisheries Report of Japan

Koji Uosaki[1], Hidetada Kiyofuji[1] Hiroaki Matsunaga[1], Kazuhiro Ohshima[1],
Seiji Ohshimo[1], Keisuke Satoh[1], Yasuko Senba[1] and Yujiro Akatsuka[2]

[1] *National Research Institute of Far Seas Fisheries*
Fisheries Research Agency
(FRA NRIFSF)

[2] *Fisheries Agency of Japan*

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If no, please indicate the reason(s) and intended actions:	

SUMMARY

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. Total number of commercial longline vessels shows a declining trend, from 432 vessels in 2011 to 338 in 2015. Total number of pole-and-line vessels (larger than 20 GRT) has decreased during the 2011-2015. For the purse seine vessels, the number of vessels shows no apparent trend in the 5-year period, ranging between 70 and 75 vessels.

The total 2015 WCP-CA catch of tunas (Pacific bluefin, albacore, bigeye, yellowfin and skipjack) by the Japanese fishery was still provisional and estimated to be 330,919 mt, and this is corresponding to 92% of 2014 total tunas catch (360,995 mt). In 2015, the total tuna catch by the purse seine fishery was 192,679 mt (58% of the total), with 93,308 mt (28%) by the pole-and-line fishery, 38,758 mt (12%) by the longline, and the remaining (2%) by the other gears, Japan has conducted several research activities in relation to biological and stock assessment studies on tunas, and other bycatch species in the WCP-CA in 2015 and early 2016 such as several research cruises on larvae/juvenile sampling for Pacific bluefin tuna and tropical tunas, and mitigation studies for bycatch species.

1. Introduction

This paper describes recent trends in the Japanese tuna and billfish fisheries, e.g., longline, pole-and-line, purse seine and the other fisheries in the WCPFC Convention Area (WCP-CA), including fleet size, catch and fishing effort statistics. With respect to the recent research activities, a brief explanation was given at section 6 of this report.

The catch statistics is given not only in WCP-CA but in the other areas, depending on species, according to the section on "Annual Catch Estimates" contained in the document "Scientific Data to be provided to the Commission". The catch estimates for bigeye, yellowfin, blue marlin, black marlin and skipjack in the portion of the WCP-CA east of the 150˚ meridian of west longitude, which is the duplicating area with IATTC, is shown in Appendix Table 1. This is requested by Attachment N of the report of the SC4. 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. The catch estimates for Pacific bluefin, albacore, swordfish and striped marlin in other broad ocean areas are shown in Appendix Table 2. In addition to this, a number of tables which are requested by CMMs were given in the Appendix Tables.

2. Data source

The National Research Institute of Far Seas Fisheries (NRIFSF) is responsible for compiling catch and effort statistics for major fisheries (pole-and-line vessels larger than 20 GRT, longliners larger than 10 GRT, and tuna purse seiners). The other minor fisheries are referred to in the publication of the Statistics Department, Minister's Secretariat, Ministry of Agriculture, Forestry and Fisheries for 2011-2014 data (MAFFJ 2012-2015, MAFFJ 2016), and presented in this paper.

3. Trends in fleet size

Table 1 shows the number of Japanese tuna fishing vessels by fishery and vessel size class, which actually fished in the WCP-CA during the 2011-2015 (coastal longline vessels were not included). As this number of active vessels is estimated basing on logbook submitted, some vessels which actually operated but did not submit logbook were not included. The research and training vessels of longline and pole-and-line are not included.

The number of Japanese commercial longline vessels shows a declining trend, from 432 vessels in 2011 to 338 in 2015. Especially, the declining trend for size categories over 200 GRT is remarkable; the number of vessels in this category was 69 vessels in 2015 which is 62% of that in 2011.

The total number of pole-and-line vessels (larger than 20 GRT) has decreased during the 2011-2015. The number of vessels for the category 50-200 GRT decreased from 63 in 2011 to 51 in 2015, corresponding to 19% decrease. The number of vessels for the category over 200 GRT decreased from 28 in 2011 to 23 in 2015, corresponding to 18% decrease.

The total number of purse seine vessels which are engaged in tuna fishery shows no apparent trend in the 5-year period, ranging between 70 and 75 vessels. The number of vessels of 50-200GRT ranged from 30 to 34 without apparent trend during the period. Note that the number of distant water purse seiners which are allowed to operate in the tropical waters in the Pacific Ocean by government regulation was 35 and has been stabilized since 1995.

4. Trends in catch and effort

The total 2015 WCP-CA catch of tunas (Pacific bluefin, albacore, bigeye, yellowfin and skipjack) by the Japanese fishery was still provisional and estimated to be 330,919 mt, and this is corresponding to 92% of 2014 total tunas catch (360,995 mt). In 2015, the total tuna catch by the purse seine fishery was 192,679 mt (58% of the total), with 93,308 mt (28%) by the pole-and-line fishery, 38,758 mt (12%) by the longline fishery, and the remaining (2%) by the other gears, whereas, in 2014, the total tuna catch by the purse seine fishery was 210,924 mt (58% of the total), with 98,017 mt (27%) by the pole-and-line fishery, 44,574 mt (12%) by the longline, and the remaining (2%) by the other gears. The following is the description of each fishery in more details including tables of their catch and effort in the WCP-CA.

4.1. Longline fishery

Japanese longline vessels are classified into three categories (coastal, offshore and distant water longline fisheries) according to the operation area and vessel size. Coastal longliners, whose size is 1-20 GRT, are allowed to fish only in Japan's EEZ. Offshore longline vessels are further divided into two categories, small offshore ones, 10-20 GRT, and offshore ones, 10-120 GRT, both of which are able to go beyond Japan's EEZ in the Pacific Ocean with some restricted areas in the eastern Pacific Ocean. Although the vessel size of two offshore categories is duplicated in the range of 10-20 GRT, most vessels of the latter category are larger than 50 GRT. Distant water

longliners are over 120 GRT and basically can fish in all oceans, but need to follow the various domestic regulations that will ensure the management measures imposed by the each tuna RFMO.

Most recent statistics available are 2015 data, though the 2014 and 2015 data are still preliminary. Catches in weight of tuna species (Pacific bluefin, albacore, yellowfin, bigeye and skipjack), swordfish and billfishes (striped marlin, blue marlin, black marlin, sailfish and shortbill spearfish) caught by the Japanese distant water and offshore (not including small offshore) longliners in the WCP-CA from 2011 to 2015 are shown in Table 2A. Historical changes in fishing effort and catch by species are shown in Figs. 1 and 2, respectively, for the years 1971-2015. The total effort (in number of hooks) of distant water and offshore longline fisheries in all oceans decreased from 556 million hooks in 1981 to 495 million in 1983 and increased again to 557 million in 1988 after which it decreased steadily to less than 400 million since 1999. The ratio of the fishing effort exerted in the Pacific Ocean to that of the total fishing effort was about 40-50% in the latest decade. In the WCP-CA, around 60% of the total Pacific effort has been deployed since the middle of the 1980s. The fishing effort of distant water and offshore longlines in the WCP-CA, which was 106 million hooks in 2004, decreased to less than 100 million, thereafter. In recent years, the fishing effort was 65 million hooks in 2009, which is historically lowest, and recovered in the following years (Table 2A). This recovery seems to be partially caused by the shift of fishing ground from the Indian Ocean because of the expanding piracy activities in the western Indian Ocean. Primary species for the longline catch are yellowfin and bigeye historically. Among the species caught, yellowfin catch was around 60,000 mt at a peak during the late 1970s and the early 1980s and has since declined continuously to about 10,000 mt or less in the recent years (Fig. 2). Bigeye catch which had been relatively stable during the 1970s and 1980s ranging between 30,000 and 50,000 mt, but decreased to between 20,000 and 30,000 mt during the mid-1990s to early 2000s. Further, bigeye catch continued to decrease: less than 20,000 mt after 2005, was less than 10,000 mt after 2009. In the recent five years, the yellowfin catch shows a declining trend: 3,927 mt in 2015 which is 56% of that in 2011. The bigeye catch also shows a declining trend: 5,742 mt in 2015 which is 70% of that in 2011 (Table 2A).

The average quarterly effort distribution of distant water and offshore longline vessels during the 2013-2015 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 patterns of the effort do not show remarkable seasonal changes, but in the overall area, the fishing effort appeared to decrease in the second quarter than in the other quarters. Distribution of the catch by species by 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 and yellowfin) targeting in the equatorial waters.

As for the small offshore longline fishery, catches in the WCP-CA from 2011 to 2015 are shown in Table 2B. The total number of hooks deployed by small offshore longliners ranged between 55,964 thousand and 76,397 thousand. Bigeye catches for the small offshore longline show no apparent trend in the 5-year period: 6,585 mt in 2015. Yellowfin catches for the small offshore longline show no apparent trend: 3,616 mt in 2015, which is 92% of that in 2011. Geographical distributions of fishing efforts and catches by species by the small offshore longliners were shown in Figs. 5 and 6, respectively. At the area between 130˚E and 150˚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. In the south of 15˚N, bigeye and yellowfin are primary target species.

4.2. 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 during the 2011-2015. In addition to this, historical changes in catch by species and effort are shown in Fig. 7 for the period of 1972-2015. The data for 2015 are preliminary. Both the catch and effort which were at a peak around the late 1970s gradually decreased throughout 1980s. After 1991, the total catch and effort had been relatively stable until the mid-2000s, though the catch showed some fluctuations. After that the catch decreased though the effort was relatively stable. Total annual catches which ranged from 250,000 to 300,000 mt in the 1970s and early 1980s, decreased to around 150,000 mt in the 1990s and around 100,000 mt in 2009 and 2010. Skipjack occupied the major part of catches followed by albacore and yellowfin. The number of fishing days exceeded 60,000 in 1970s but it is about 15,000-17,000 days from 2006 onward.

In the recent five years, the number of fishing days (including no catch) for this fishery shows a declining trend: 12,255 days in 2015 which is 84% of that in 2011 (Table 3). The total catch of tunas (skipjack, bigeye, yellowfin, albacore and bluefin) in 2015 was 82,670 mt, which is 5% decrease from that in 2014. The skipjack catch was 59,656 mt in 2015, which is 10% increase from that in 2014.

Seasonal distributions of fishing effort (fishing days in 1x1 degree area) of the pole-and-line fishery are shown in Fig 8 as the average of 2013-2015. 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 grounds, in subtropical waters, north of the North Equatorial Current area was also the important fishing ground for this fishery in first, second, and fourth quarters of the year. In the third quarter fishing grounds off northern Japan expanded to further east of 170˚E. There were few operations in the tropical waters south of 15˚N in the third quarter.

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

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

4.3. Purse seine fishery

The catch and effort statistics in the WCP-CA by the Japanese tuna purse seine fishery (larger than 50 GRT in vessel size) are shown in Table 4 from 2011 to 2015. In addition to this, historical changes in catch by species and effort are shown in Fig. 10 for the period of 1970-2015. The data for 2015 are preliminary. The fishing effort was less than 5,000 days in the 1970s, rapidly increased in the early 1980s, then the effort fluctuated between 7,500 to 9,500 days (Fig. 10). The total catch of this fishery showed rapid increase in the early 1980s, then, gradually increased until the late 2000s. Skipjack occupied the major part of catches followed by yellowfin.

In the recent five years, the number of fishing days (including only searching) for this fishery shows a declining trend: 5,773 days in 2015 which is 72% of that in 2011 (Table 4). The total catch of the purse seine fishery shows no apparent trend in this five year period, ranging between 194,997 mt and 237,097 mt. Skipjack catch was 147,729 mt in 2015, which is 94% of that in 2011 (156,401 mt). Yellowfin catch was 35,508 mt in 2015, which is 105% of that in 2011 (33,887 mt).

The fishing effort (fishing and searching days) for the purse seine fishery distributed in two regions: tropical waters and northern waters. They are clearly separated by the border of 20˚N (Fig. 11). The fishing grounds in the tropical waters were developed widely between 10˚N, 130˚E and 10˚S, 180˚ with some seasonal fishing ground shifts. In the northern waters, the skipjack fishing season starts in April and continues until the third quarter in the vicinities of Japan in the Pacific Ocean. Geographical distributions of catches for skipjack, yellowfin and bigeye are shown in Fig. 12. In most regions, skipjack was the largest part of the catch among these three species in each 1˚ x 1˚ block as shown in Fig. 11.

This fishery utilizes tuna schools in association with natural log and FADs mainly in equatorial fishing grounds (Fig. 13). However, the operations for free swimming schools were dominant both in the equatorial waters and northern waters.

Number of purse seine sets associated with whale sharks and cetaceans is currently being added up.

According to the reports of the master of a vessel/observer, Japanese tuna purse seine set a net on schools of tuna associated with a cetacean and whale shark unintentionally was 8 times and 215 times. All whale sharks were release alive but one cetacean was dead before releasing.

4.4. Other coastal fisheries

Besides the major tuna fisheries described above, there are miscellaneous coastal fisheries, which also catch tunas and tuna like species such as troll, setnet and gillnet fisheries. The catches by such fisheries during the 2011-2015 are shown in Table 5. The figures in 2015 are preliminary.

There used to be two kinds of large-scale gillnet (driftnet) fisheries. One is a large-mesh driftnet fishery, which fished billfishes and tunas, and the other is a squid driftnet fishery, which fished flying squid. Those fisheries used to operate in the wide area of high seas in the Pacific Ocean, but stopped the operations on the high seas of the North Pacific in January 1993 due to a UN moratorium on the use of large-scale driftnets on the high seas. After 1993, the former gillnet fishery started operating within the Japanese EEZ targeting tunas and billfishes. Swordfish, striped marlin and skipjack are primary target species in the fishing ground. The annual catch by the fishery has been less than 1,500 mt since 1993.

The troll fishery takes various pelagic species including tunas. The size of troll vessels are generally small, mostly less than 10 GRT, and they make one-day trip. All catches by the troll gear are made within territorial seas. Skipjack is very important resources for the troll fishermen in the local communities and a very low level of skipjack catch by troll along the Pacific coast in the western Japan is getting a big political issue in recent years.

The setnet (also called as “trap net”) fishery also catches pelagic species including tunas.

4.5. Total catch for tropical tunas for all gears combined

The total catch of tropical tunas by all gears combined, including coastal fisheries (longline, pole-and-line, troll and other miscellaneous gears), are shown in Table 6 for 2011-2015. The data in 2014 and 2015 are

preliminary. The total catch of skipjack shows no apparent trend ranging between 217,536 mt and 269,098 mt during this period, but a decreasing trend in the last three years. The total catch of bigeye shows no apparent trend, ranging between 17,825 mt and 22,706 mt. The total catch of yellowfin shows no apparent trend ranging between 37,463 mt and 53,904 mt .

5. Status of tuna fishery data collection systems

5.1. 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. Coastal, small offshore and offshore vessel have to submit it by each cruise within three months after the cruise was finished while distant water longliners are required to submit it every ten days. The log sheet of longline contains 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. 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 log sheets. Additionally, information on the cruise (date and port of departure and arrival of the cruise), vessel (name, size, license number and call sign), the number of crew and the configurations of the fishing gear (material of main line and branch line) are asked to fill in on the top part of the sheet by each cruise.

Submitted log sheets are processed into electronic data files. Error checks for various types of information, 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 the corresponding register.

Because the coverage rate of log sheets is not necessarily 100% for longline fisheries, 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 the Japanese EEZ), the coverage rate has been about 90 - 95% of total operation (Table 7). In the case of the distant water longline fishery, information on the total number of operations aggregated by sub-areas and month provided by the fishermen's association (Federation of Japan Tuna Fisheries Co-operative Association) was used to raise the log sheet data to the total catch. For the offshore longline vessels larger than 20 GRT, the total number of operation by prefecture (which the vessel belongs to) by year given by MAFFJ has been used for the raising. Since 2008, Vessel Monitoring System (VMS) information is utilized to raise the log sheet data for both fisheries. As for the coastal and small offshore longliners, reliable information of coverage rate is not available. But it is considered to be about 90% or more for small offshore as far as basing on the number of registered vessels.

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

Pole-and-line

The license holders of the distant water pole-and-line or the offshore pole-and-line (mostly vessel larger than 20 GRT) are required to submit a log sheet on their operations and catch information to the Japanese government within 30 days after the cruise. The log sheets submitted to the government are forwarded to the NRIFSF, and are then compiled. Although the log sheet 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 log sheet 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 log sheet at least once) / (Number of vessels which actually operated).

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

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).

In 2011, the reporting system from fishermen to the government was changed for the cruises for which purse seine vessels operates in the Sea of Japan or the East China Sea. Such fishermen used to submit the log sheets designed for tunas when they operated targeting tunas or submit the log sheets designed for small pelagics, such as mackerel sardines and anchovies, when they operated targeting small pelagics. The NRIFSF used to compile the

logbook data only for the tuna targeting operation. After implementation of the new system, fishermen submit a single kind of log sheets regardless of target species. As a result, the logbook data used for fishing operations in the Sea of Japan or the East China Sea now have a large quantity of zero catch records of tuna, so care should be given when interpreting the fishing effort for tunas using the data coming from the new log sheets..

5.2. Size data collection and compilation

The NRIFSF has collected size data for tuna and tuna like species to use for biological study and to provide to stock assessments. There are several kinds of data source for the size data such as at-sea sampling and port sampling for the fish caught by commercial fisheries and onboard sampling by training and research vessels.

5.2.1. At-sea sampling on commercial fishing vessels

Length data is voluntarily collected for all tunas and billfishes by fishermen who are on board distant water longline vessels. Fishermen recorded the data in the field note which is provided by the NRIFSF, and send the field note back to the NRIFSF after the completion of the cruise. The length data reported by the at-sea sampling is compiled on a daily basis as temporal resolution and 1˚x1˚block basis as geographical resolution and is stored in a specific database for size data for tunas and billfishes. In some cases, fishermen take measurement at an interval of 2cm or 5cm though the NRIFSF encourages measurement at an interval of 1cm.

5.2.2. At-sea sampling on training and research vessels

Size data is collected for not only tunas and billfishes but also all animals caught by training and research vessels using longline gears. The crew and/or students measured the length and weight of the animals retrieved on board and reported the data to the NRIFSF. Size data is collected for skipjack (and the other species sometimes) by training and research vessels using pole-and-line gears. The crew and/or students measured the length and weight of skipjack retrieved on board and reported the data to the NRIFSF. Size data received from training/research vessels is compiled and stored in the same manner as the at-sea sampling on commercial fishing vessels.

5.2.3. Port sampling

Port sampling is an important way to collect size data and occupies the large percentage of size sampling which the NRIFSF has been conducting. Measurement is done at a timing between unloading from fishing vessels and starting of auction. Samplers randomly conduct measurement in general but conduct measurement for all individuals in some cases. In general, size data collected by port sampling is compiled on a monthly basis as temporal resolution and by specific blocks of 1˚x1˚, 5˚x5˚, 5˚x10˚ or 10˚x20˚ as geographical resolutions, depending on the width of the range of fishing position at the cruise. The temporal and geographical resolution is determined by the range of each cruise in which size sampling is done based on the information in the interview with the captain or fishing master of the fishing vessel at unloading sites and/or logbook data reported by fishermen.

As a special case, skipjack unloaded as unfrozen fish is recorded in a different way from the above even in measurements by port sampling. In most cases of measurement of such skipjack, information of the fishing dates on a daily basis and fishing positions on a minute basis (finer than 1˚x1˚ block) are recorded on the size database for skipjack, since fishing dates and fine positions can be specified by the interview.

Port sampling for distant water purse seiners has been carried out in a different way, which is conducted at three ports (Yaizu, Makurazaki and Yamagawa). The number of annual samplings is about 25 in average, which is more than 10% coverage (25/220) on a cruise number basis. Size data is collected for skipjack, yellowfin and bigeye. Fish form a commercial vessel was selected from a single well, which is filled up with fish caught by a single operation. Thus, the fishing date, fishing location and school type (associated school, free school) for these fish are identified by the hatch plan (a fish unloading plan describing the amount of catch by species for each well with the fishing date and location) sent from vessel captains before unloading. In general, only one vessel per one port sampling is selected, and fish from one to three wells of the vessel are measured for the individual length and partially weight. About 1,000 kg fish per well were measured in average.

The followings are species, types of gear/fishery and locations of sampling site for port sampling conducted in 2015;

- Size data was collected for albacore and skipjack caught by distant water pole-and-line vessels by the NRIFSF staff at Yaizu.
- Size data was collected for albacore caught by offshore pole-and-line vessels by the NRIFSF staff at Katsuura a few times a year.
- Size data was collected for skipjack, yellowfin, and bigeye caught by distant-water purse seine vessels by the staff of an organization contracted with the government at Yaizu, Makurazaki and Yamagawa.
- Size data was collected for skipjack caught by the middle-sized pole-and-line vessels which unload unfrozen fishes at Kesennuma by the NRIFSF staff.

- Size data was collected for albacore, swordfish and striped marlin and sharks caught by the offshore longline vessel at Kesennuma by the NRIFSF staff.
- Size data was collected for Pacific bluefin caught by the vessels of most of fishing gears at most of prefectures where bluefin is unloaded under the nationwide port sampling project. Also size data was collected for albacore, yellowfin, bigeye and swordfish and billfishes caught by offshore and small offshore and coastal longline vessels, for skipjack caught by mid-sized pole-and-line at major landing ports under the same project.

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

6.1. Observer program

Two kinds of national observer programs have been conducted in the WCP-CA, one for purse seiners and the other for longliners.

The observer program for purse seine boats has been implemented in the tropical Pacific Ocean since 1995. The details of time and position at each operation, type of association, and the length frequencies of samples were taken by scientific observers in each operation. After 2012, the observer program for tuna purse seiners in the vicinity of Japan's waters has been started. Six purse seine cruises were observed from May to September 2015 in the vicinity of Japan. Days spent for these cruises ranged from 9 to 25 days. They returned to their port frequently without filling up their fish wells in one cruise.

The observer program for longliners in the WCP-CA started in 2008. The information on fishing vessels, fishing operations and almost all the catches in each operation were identified and measured as much as observer can. Thirty cruises of distant water and offshore longline vessels and 75 cruises of small offshore longline vessels were observed in the 2015 calendar year. The data from 22 distant water cruises and 73 small offshore cruises were inputted to the database and the number of operations and species observed in each fishery was shown in Table 9.

6.2. Tagging

Skipjack tagging

Skipjack tagging has been conducted mainly to investigate migration patterns to the fishing ground off Japan. One offshore pole-and-line vessel was chartered and tagging was conducted in the south of Japan between February and March in 2015. A total of 1934 skipjack tuna were tagged and released, including 149 fish with an archival tag (Lotek LAT2910). To date nine fish was recaptured. In addition, skipjack tagging has been conducted in cooperation with Ajinomoto Co., Inc. in the coastal area of southwestern Japan since 2009. In 2015, 337 skipjack tuna were tagged and released, including 139 fish with an archival tag and 41 fish with a sonic tag, around Yonaguni Island (24˚N, 123˚E) in February - March and May - June, and so far six fishes including two fishes with an archival tag were recaptured.

Besides the above studies, four research/training pole-and-line vessels conducted skipjack tagging in the area 19-38˚N, 138-150˚E in May and June 2015. The total of 693 skipjack were released with the conventional tag, and 102 were recovered. By one of these vessels, a collaborative study of archival tagging with the NRIFSF has been conducted since 2010. In 2015, a total of 87 archival tags were deployed in the south of Japan and around Izu Islands (area southward from the central part of Japan) in May to June, respectively and six fish were recaptured. Another collaborative study was conducted in 2015 and a total of 40 skipjack tuna caught by troll were released with an archival tag around Hachijo Island (33˚N, 139˚E) in May, and two fishes were recaptured.

6.3. Research cruise conducted

PBF larval/juvenile sampling

Since 2011, larval surveys have been conducted to estimate the current main spawning area and period of PBF. In 2015 research cruises were conducted for ecological study of larval/juvenile PBF by R/Vs Shunyo-Maru, Yoko-Maru, and five prefectural R/Vs. Larval surveys were conducted in the south of Japan around Nansei Islands area, which is a major spawning ground of PBF, from 9 May to 13 August. The surveys found that PBF larvae were found in the south of Yaeyama Islands and in the southwest of Miyako Island. Larval surveys were conducted also in the Sea of Japan, which is another spawning ground of PBF, from 19 July to 5 August, and PBF larvae were captured in the west of the Noto Peninsula and the east of Oki Islands. Compiling the four years cruise data from 2011 to 2014, the spawning grounds of PBF were estimated by simulating backward Lagrangian transportation model. The results suggest that PBF start spawning late April in the west of Yaeyama Islands and east of Okinawa Main Island, the main spawning grounds were estimated to be along the Kuroshio Current and east of Okinawa Main Island. While in the Sea of Japan, PBF start spawning late June, and the main spawning grounds in the Sea of Japan were estimated in the waters around Oki Islands.

Tropical tuna species and skipjack larval/juvenile sampling

In order to better understand the relationship between recruitment variability and growth during the early life

stage of tropical tunas, a cruise was conducted with the aims to (1) describe the variations of the early life stage growth among areas and (2) describe the horizontal distribution of skipjack and tropical tunas. The research cruise was conducted from 6 Nov. 2015 to 21 Dec. 2015 in the North Equatorial Current and the adjacent waters including the EEZ of the northern Mariana and the Republic of Palau. This research cruise conducted CTD (XCTD) observations, mid-water trawl, mid-water gillnet, 2-m ring plankton net tows and NORPAC. These sampling gears collected larvae and juveniles of tuna species and skipjack as well as water to measure chlorophyll-a concentration.

6.4. Bycatch species related research

Mitigation studies for seabirds

Effectiveness of tori line and weighted branch lines (Lumo lead, light device and Hook Pod) to reduce seabird bycatch was examined using a Japanese research vessel (Den-Maru No.37, 167 GRT) in the North Pacific from April to June 2016. The survey area was shifted to southern area this year, covering the area of 20º-35ºN and 125º-140ºE, exclusive of the East China Sea. Lumo lead, light device and Hook Pod as well as tori line showed their effectives in reducing chances of seabird attacks to hooked baits and any incidental catch of seabirds did not at all occur during the survey trips. The results suggest that sole deployment of tori line, Lumo lead, light device or Hook Pod has potential to reduce seabird bycatch by pelagic longline fisheries in the North Pacific.

The tori line for small longline vessels was agreed at the WCPFC12. In 2015 the effectiveness of the mitigation measure (A: tori-line of polyethylene without streamer, B: tori-line composed of bundled 3 polypropylene bands without streamer) was examined using chartered commercial small longline vessel (Hanei-Maru No. 188, 19 GRT) in the western North Pacific. It was found that both types of tori-line without streamer deployed in this experiment substantially reduced seabird bait attack and by-catch compared to the case of no tori line. Trial implementation of a light streamer tori-line for large longline vessels showed possibility of entanglement of fishing gear during line setting.

References

MAFFJ 2013-2015. Annual report of catch statistics on fishery and aquaculture, 2011-2013. Statistics Department, Minister's Secretariat, the Ministry of Agriculture, Forestry and Fisheries of Japan.

MAFFJ 2016. Annual report of catch statistics on fishery and aquaculture 2014, on the portal site for governmental statistics "e-Stat" (published in April 26, 2016). https://www.e-stat.go.jp/SG1/estat/GL08020103.do?_toGL08020103_&listID=000001152156&requestSender=dsearch

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. In the number of longline vessel, coastal longliner and training/research vessels are not included. In the number of pole-and-line vessel, research and training vessels are not included.

Longline

	10-50 ton	50-100 ton	100-200 ton	200- ton	Total
2011	272	24	25	111	432
2012	262	21	21	98	402
2013	257	20	23	109	409
2014	246	18	21	84	369
2015	(227)	(18)	(24)	(69)	(338)

Pole-and-line

	20-50 ton	50-200 ton	200- ton	Total
2011	0	63	28	91
2012	0	60	27	87
2013	0	55	25	80
2014	1	54	25	80
2015	(1)	(51)	(23)	(75)

Purse Seine

	50-200 ton	200-500 ton	500- ton	Total
2011	33	36	4	73
2012	34	37	4	75
2013	34	37	4	75
2014	33	37	3	73
2015	(30)	(35)	(5)	(70)

Table 2. Fishing effort (in 1000 hooks) and catch (MT) in the WCPFC Convention Area by species for the Japanese distant and offshore (top table) and small offshore (bottom table) longline fisheries. Figures in the parentheses indicate provisional data.

Distant water (120- GRT) and offshore (10-120 GRT) longlines

	#hooks	PBF	ALB	BET	YFT	SWO	MLS	BUM	BLM	SFA	SSP	SKJ
2011	70,446	20	7,351	8,255	7,033	2,996	442	1,478	29	75	130	125
2012	68,164	13	7,585	8,375	7,065	3,243	425	1,137	20	45	111	199
2013	61,138	12	6,779	6,269	4,761	3,420	407	990	31	66	169	207
2014	(50,998)	15	(5,757)	(7,211)	(3,653)	(3,216)	(310)	(938)	(26)	(48)	(138)	(156)
2015	(44,475)	15	(5,058)	(5,742)	(3,927)	(3,611)	(283)	(694)	(23)	(34)	(53)	(82)

	BSH	LMD	POR	SMA	OCS	THR	FAL	SPN	RHN	O-shk	Total
2011	6,848	62	3	714	268	192	-	-	-	142	36,162
2012	10,860	467	1	751	46	84	-	-	-	27	40,454
2013	9,603	205	1	606	0	143	-	-	-	124	33,795
2014	(9,882)	(741)	8	(707)	(0)	(126)	(0)	(0)	(0)	(4)	(32,935)
2015	(10,674)	(662)	(1)	(662)	(0)	(67)	(0)	(0)	(0)	(1)	(31,572)

Small offshore longline (10-20 GRT)

	#hooks	PBF	ALB	BET	YFT	SWO	MLS	BUM	BLM	SFA	SSP	SKJ
2011	76,397	-	-	8,630	3,909	892	720	1,192	13	34	1	5
2012	71,645	-	-	7,158	2,965	981	780	998	10	31	0	4
2013	68,000	-	-	5,679	3,056	819	857	1,161	17	16	0	2
2014	(64,111)	-	-	(7,355)	(2,449)	(993)	(616)	(838)	(13)	(37)	(0)	(4)
2015	(55,964)	-	-	(6,585)	(3,616)	(981)	(715)	(657)	(13)	(25)	(0)	(6)

	BSH	LMD	POR	SMA	OCS	THR	FAL	SPN	RHN	O-shk	Total
2011	459	12	0	24	0	0	-	-	-	12	15,904
2012	524	78	0	3	0	0	-	-	-	9	13,539
2013	763	169	0	21	0	15	-	-	-	5	12,578
2014	(736)	(268)	(0)	(5)	(0)	(2)	(0)	(0)	(0)	(91)	(13,407)
2015	(468)	(368)	(0)	(1)	(0)	(2)	(0)	(0)	(0)	(3)	(13,439)

* The catches for PBF and ALB are appropriate to show hear as the category "small offshore". See also Appendix Tables 2 for PBF and ALB catches by longline.

Table 3. Fishing effort (Days fished and number of poles) and catch by species (mt) for the Japanese offshore and distant water pole-and-line fishery in the WCPFC Convention Area. Figures in parentheses indicate provisional data.

year	#days	#pole	SKJ	YFT	BET	PBF	ALB	Total
2011	14,564	275,484	73,103	2,603	2,239	63	25,647	103,654
2012	14,804	280,356	57,266	1,679	2,036	113	33,650	94,743
2013	13,288	252,667	71,309	1,150	2,340	8	33,507	108,315
2014	12,642	241,878	54,234	1,172	2,612	5	29,352	87,375
2015	(12,255)	(229,553)	(59,656)	(1,256)	(614)	(9)	(21,135)	(82,670)

* PBF catches for offshore and distant water pole-and-line were not estimated separately. See also Appendix Table 2 to see statistics for PBF catch.

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.

	#days	SKJ	YFT	BET	PBF*	ALB	Total
2011	8,036	156,401	33,887	2,675	-	462	201,461
2012	7,370	193,372	28,742	3,493	-	4,121	237,098
2013	7,208	181,605	22,513	2,820	-	1,985	216,132
2014	6,487	167,378	31,987	4,000	-	2,009	211,862
2015	(5,773)	(147,729)	(35,508)	(3,978)	-	(2,009)	(194,997)

* PBF catches for tuna purse seine were not estimated separately. See also Appendix Table 2 to see statistics for PBF catch.

Table 5. Japanese catches (mt) for miscellaneous coastal fisheries by species and gear in the WCPFC Convention Area. Figures in parentheses indicate provisional data. SKJ: skipjack tuna, YFT: yellowfin tuna, BET: bigeye tuna, PBF: Pacific bluefin tuna, ALB: albacore. SWO: swordfish, MLS: striped marlin, BLZ: blue marlin, BLM: black marlin. Figures in parentheses indicate provisional data.

Coastal longline

	SKJ	YFT	BET	PBF*	ALB	SWO	MLS	BUM+BLM	Total
2011	7	1,701	525	-	-	81	212	153	446
2012	11	1,289	446	-	-	99	200	148	447
2013	5	1,338	390	-	-	102	242	166	510
2014	9	1,218	374	-	-	96	230	131	457
2015	(9)	(1,218)	(374)	-	-	(96)	(230)	(131)	(457)

Coastal pole-and-line

	SKJ	YFT	BET	PBF*	ALB	Total
2011	9,144	1,815	100	-	57	11,116
2012	9,930	1,994	71	-	92	12,087
2013	13,003	2,182	146	-	61	15,392
2014	8,670	1,662	234	-	81	10,647
2015	(8,670)	(1,662)	(234)	-	(81)	(10,647)

Coastal purse seine

	SKJ	YFT	BET	PBF*	ALB	Total
2011	87	3	0	-	18	2,470
2012	58	2	0	-	72	90
2013	21	44	0	-	3	73
2014	87	7	0	-	0	73
2015	(21)	(44)	(0)	-	(0)	(65)

Gillnet

	SKJ	YFT	BET	PBF*	ALB	Total
2011	111	6	1	-	12	130
2012	95	6	2	-	26	129
2013	112	8	1	-	14	135
2014	119	8	0	-	11	138
2015	(119)	(8)	(0)	-	(11)	(138)

Troll

	SKJ	YFT	BET	PBF	ALB	Total
2011	1,780	2,497	141	1,820	443	6,681
2012	3,487	2,279	118	570	610	7,064
2013	2,514	1,817	116	904	302	5,653
2014	954	1,523	160	1,023	197	3,857
2015	(954)	(1,523)	(160)	(462)	(197)	(3,296)

Setnet

	SKJ	YFT	BET	PBF	ALB	Total
2011	625	111	2	1,651	50	2,439
2012	404	113	0	1,932	48	2,497
2013	209	103	5	1,415	36	1,768
2014	131	67	0	1,907	24	2,129
2015	(131)	(67)	(0)	(1,290)	(24)	(1,512)

* PBF catches for coastal longline, coastal pole-and-line, coastal purse seine and gillnet were not estimated separately. See also Appendix Table 2 to see statistics for PBF catch. ALB catches for coastal longline,was not estimated separately. See also Appendix Table 2 to see statistics for ALB catch.

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.

	2011	2012	2013	2014	2015
Skipjack					
Total	241,481	265,014	269,098	(231,835)	(217,536)
Distant water and Offshore LL	125	199	207	(156)	(82)
Distant water and Offshore PL	73,103	57,266	71,309	54,234	(59,656)
Tuna PS	156,401	193,372	181,605	167,378	(147,729)
Small offshore LL	5	4	2	(4)	(6)
Coastal LL	7	11	5	9	(9)
Coastal PL	9,144	9,930	13,003	8,670	(8,670)
Coastal PS	87	58	21	87	(87)
Gill net	111	95	112	119	(119)
Troll	1,780	3,487	2,514	954	(954)
Set net	625	404	209	131	(131)
Unclassified	93	188	111	93	(93)
Yellowfin					
Total	53,904	46,503	37,463	(44,175)	(49,221)
Distant water and Offshore LL	7,033	7,065	4,761	(3,653)	(3,927)
Distant water and Offshore PL	2,603	1,679	1,150	1,172	(1,256)
Tuna PS	33,887	28,742	22,513	31,987	(35,508)
Small offshore LL	3,909	2,965	3,056	(2,449)	(3,616)
Coastal LL	1,701	1,289	1,338	1,218	(1,218)
Coastal PL	1,815	1,994	2,182	1,662	(1,662)
Coastal PS	3	2	44	7	(7)
Gill net	6	6	8	8	(8)
Troll	2,497	2,279	1,817	1,523	(1,523)
Set net	111	113	103	67	(67)
Unclassified	339	369	491	429	(429)
Bigeye					
Total	22,706	21,847	17,877	(22,085)	(17,825)
Distant water and Offshore LL	8,255	8,375	6,269	(7,211)	(5,742)
Distant water and Offshore PL	2,239	2,036	2,340	2,612	(614)
Tuna PS	2,675	3,493	2,820	4,000	(3,978)
Small offshore LL	8,630	7,158	5,679	(7,355)	(6,585)
Coastal LL	525	448	390	374	(374)
Coastal PL	100	71	146	234	(234)
Coastal PS	0	0	0	0	(0)
Gill net	1	2	1	0	(0)
Troll	141	118	116	160	(160)
Set net	2	0	5	0	(0)
Unclassified	138	146	111	138	(138)

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

Type of fishery	2011	2012	2013	2014	2015
Distant water longline	100%	100%	100%	100%	87%
Offshore longline	100%	94%	96%	98%	87%
Small offshore longline	N/A	81%	86%	87%	78%
Coastal longline	N/A	N/A	N/A	N/A	N/A
Offshore pole-and-line (20-120 GRT)	100%	100%	100%	100%	100%
Distant water pole-and-line (over 120 GRT)	100%	100%	100%	100%	98%
Purse seine (>200GRT)	100%	100%	100%	100%	100%

Table 8. Number of operations and catch number for longline observer program in the western central Pacific in 2015.

Fishery	Small offshore longline	Distant water and offshore longline
Number of Cruises	73	22
Number of Operation	1012	728
Number of Catch Observed	39994	57907
Albacore	12585	11199
Yellowfin tuna	2616	5625
Southern bluefin tuna	2	6252
Bigeye tuna	7856	2544
Bluefin tuna	14	6
Skipjack tuna	852	322
Sailfish	65	39
Black marlin	6	20
Blue marlin	266	223
Shortbill spearfish	247	65
Striped marlin	356	75
Swordfish	489	1532
Lancetfishes	3583	1188
Opah	784	1156
Pomfrets	1074	436
Dolphin fish	389	349
Escoler	1102	872
Other fishes	1147	1475
Thresher sharks	193	191
Shortfin mako	235	1297
Blue shark	4592	20221
Other Sharks	138	1207
Sting ray	1060	947
Other Rays	7	0
Sea Birds	216	581
Sea Turtles	88	30
Mammals	6	5
Unidentified	26	50

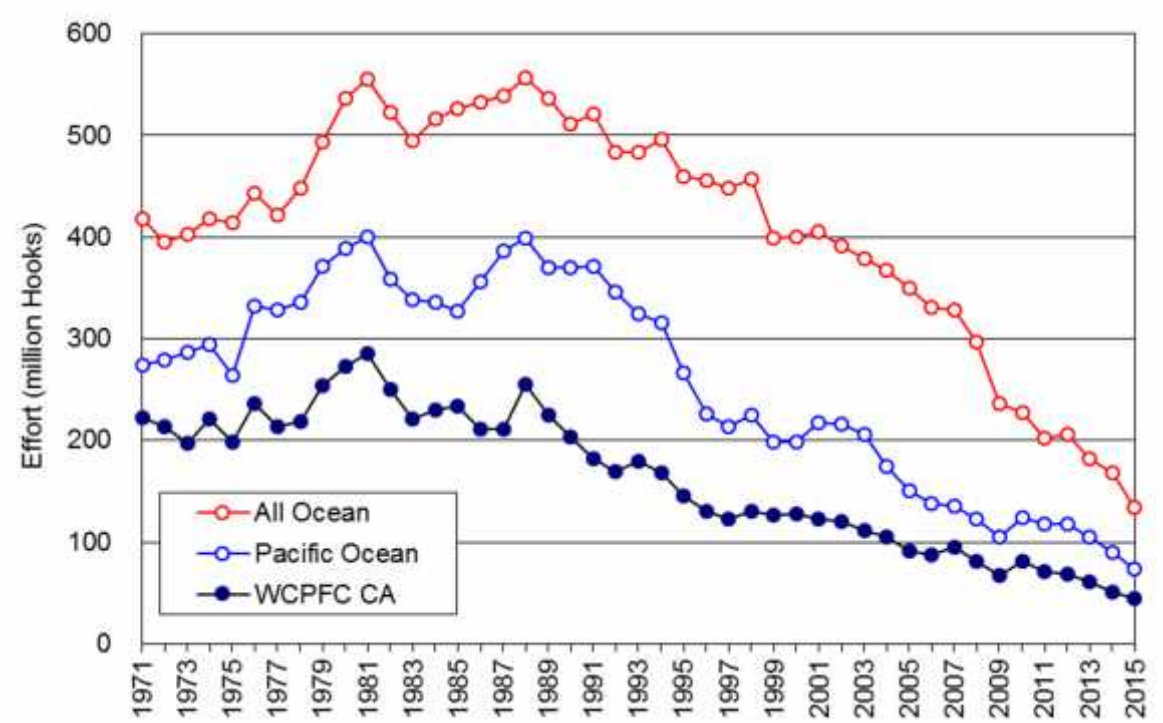

Fig. 1. Historical change in fishing effort of the Japanese distant water and offshore longline fishery (not including small offshore) in the WCPFC Convention Area. Values in 2014 and 2015 are provisional.

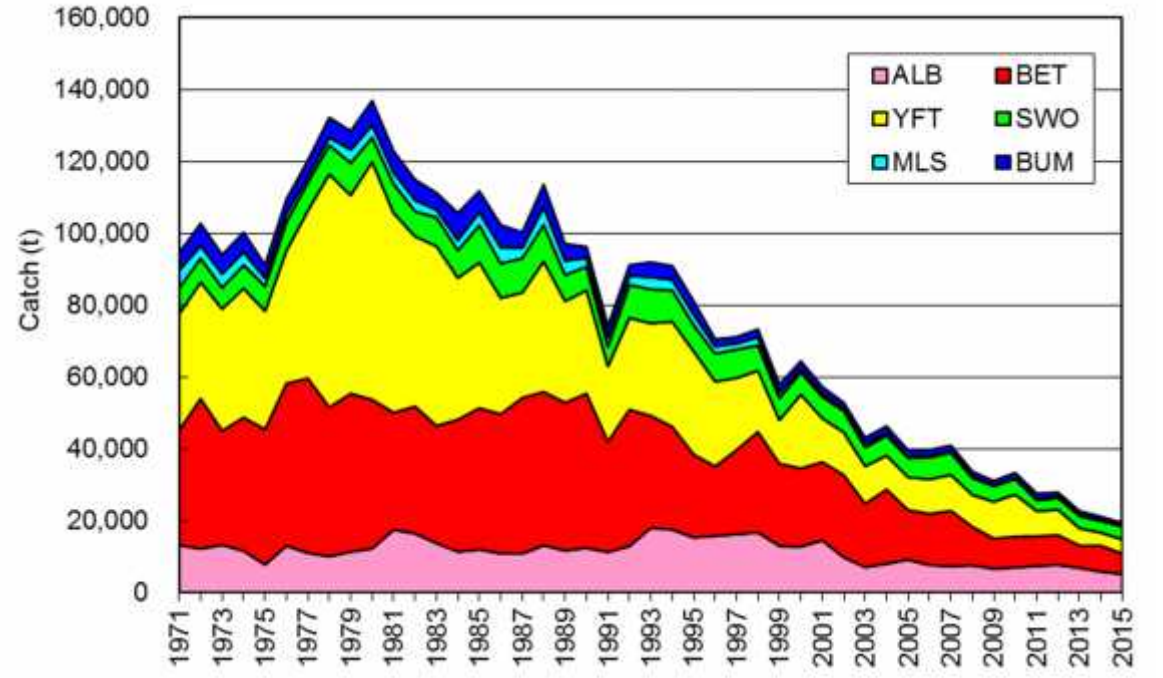

Fig. 2. Historical change of catches for major species for the Japanese distant water and offshore longline fishery (not including small offshore) in the WCPFC Convention Area. ALB: albacore, BET: bigeye, YFT: yellowfin, SWO: sword fish, MLS: striped marlin, BUM: blue marlin. Values in 2014 and 2015 are provisional.

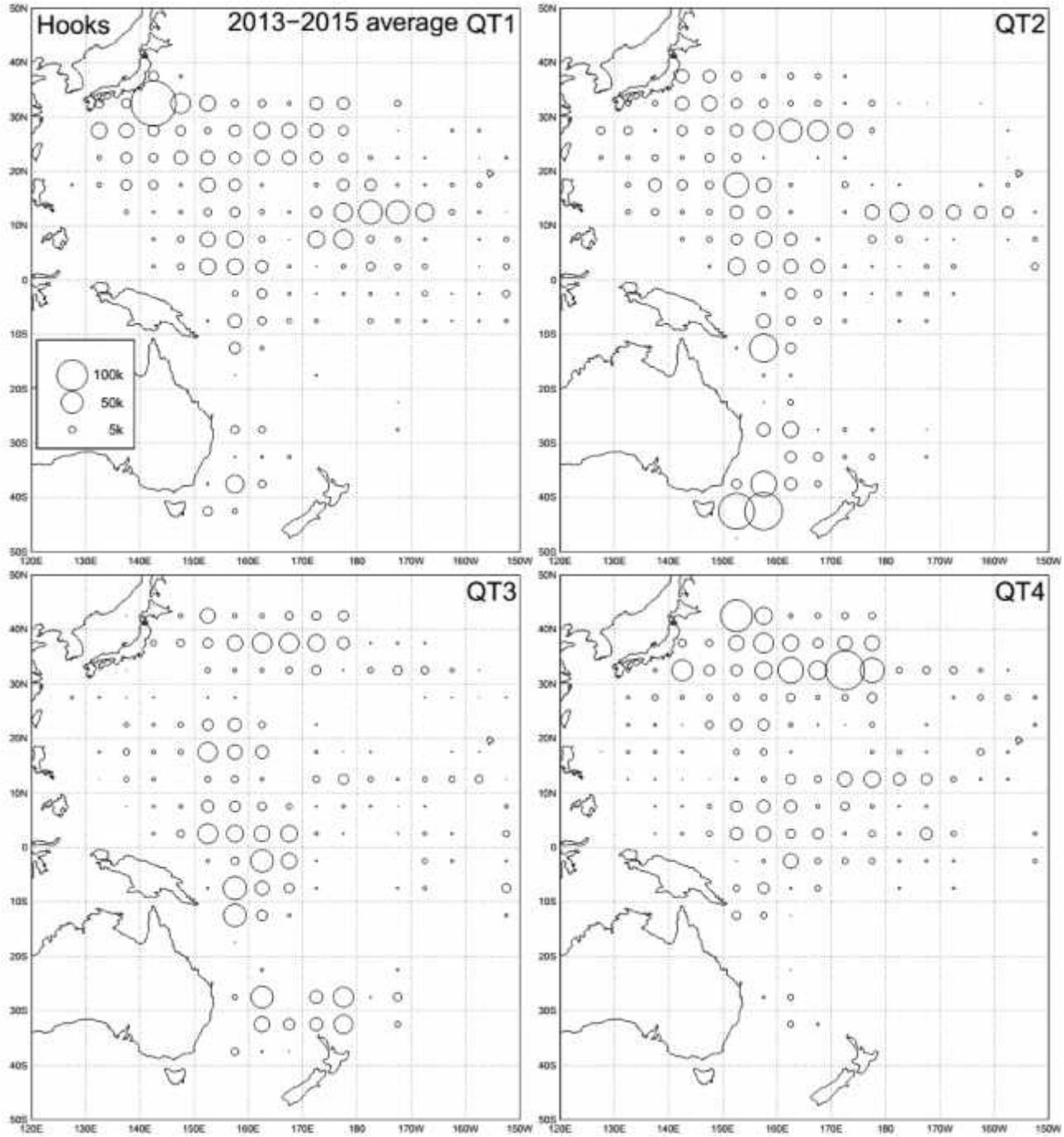

Fig. 3. Quarterly distribution of fishing effort for the Japanese offshore and distant water longline fisheries in the western and central Pacific Ocean in average of 2013-2015.

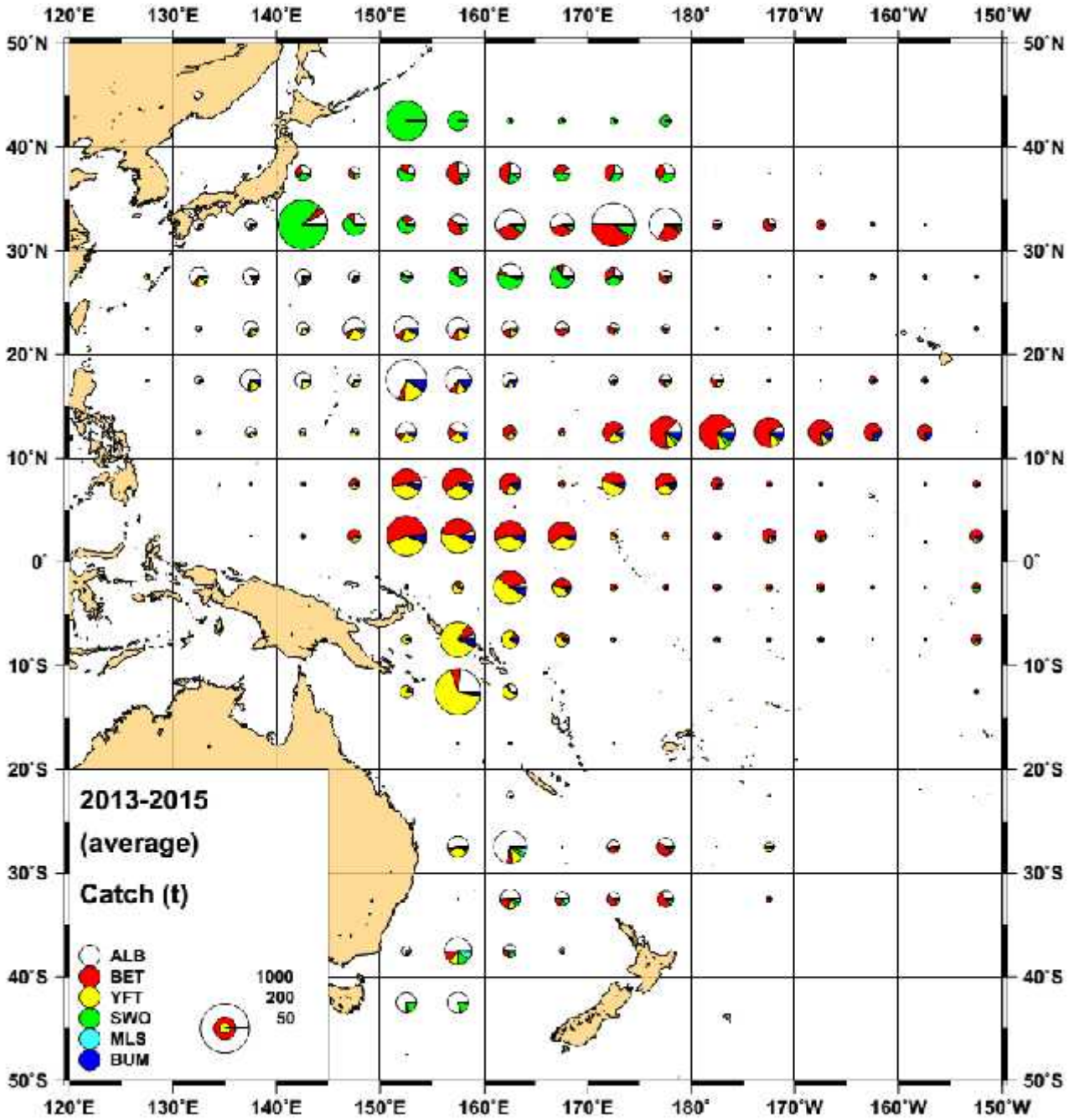

Fig. 4. Distributions of offshore and distant water longline catch (in weight) by species in average of 2013-2015 for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BUM: blue marlin).

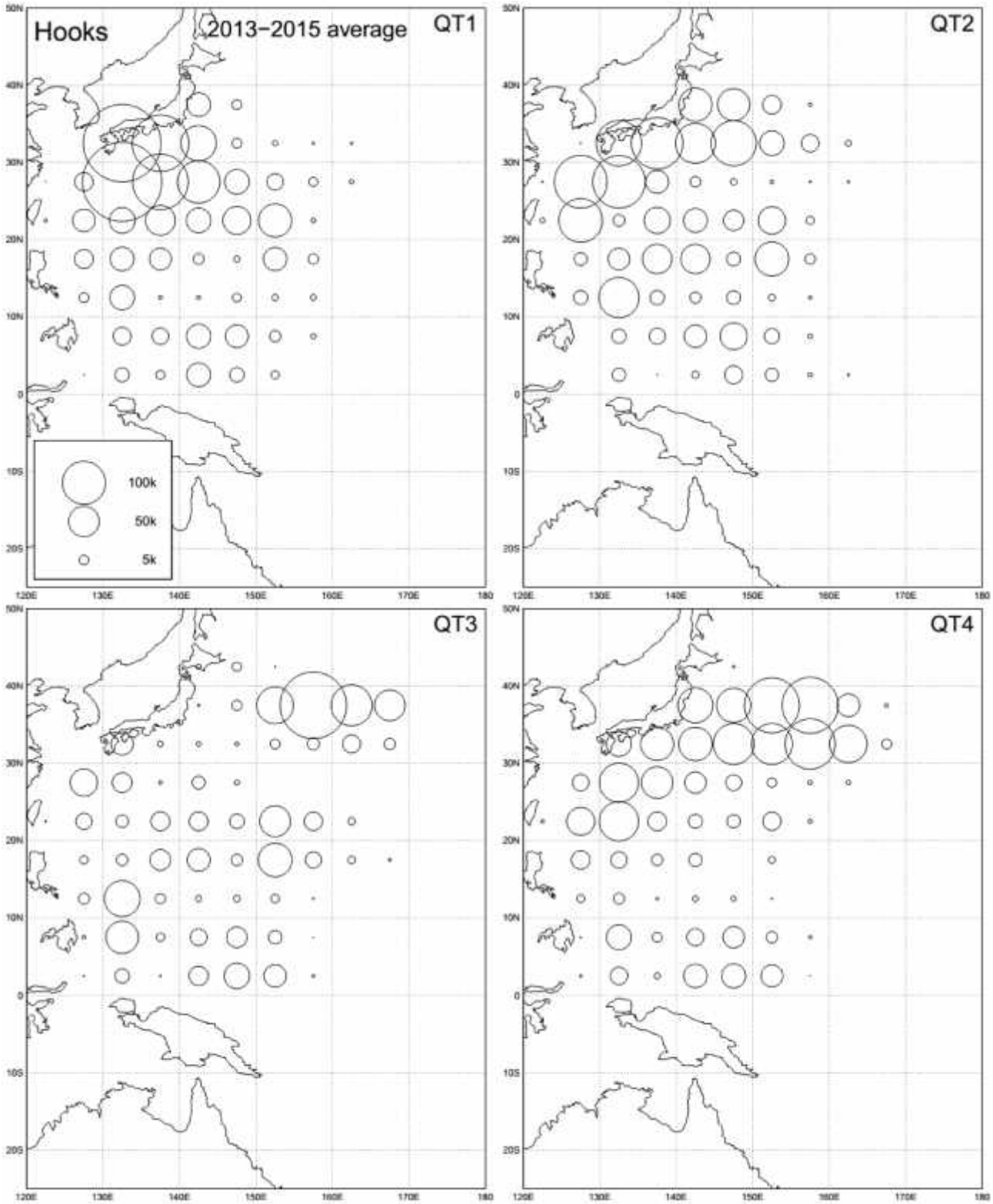

Fig. 5. Quarterly distribution of fishing effort for the Japanese small offshore longline fisheries (10- 20 GRT) in the western and central Pacific Ocean in average of 2013-2015.

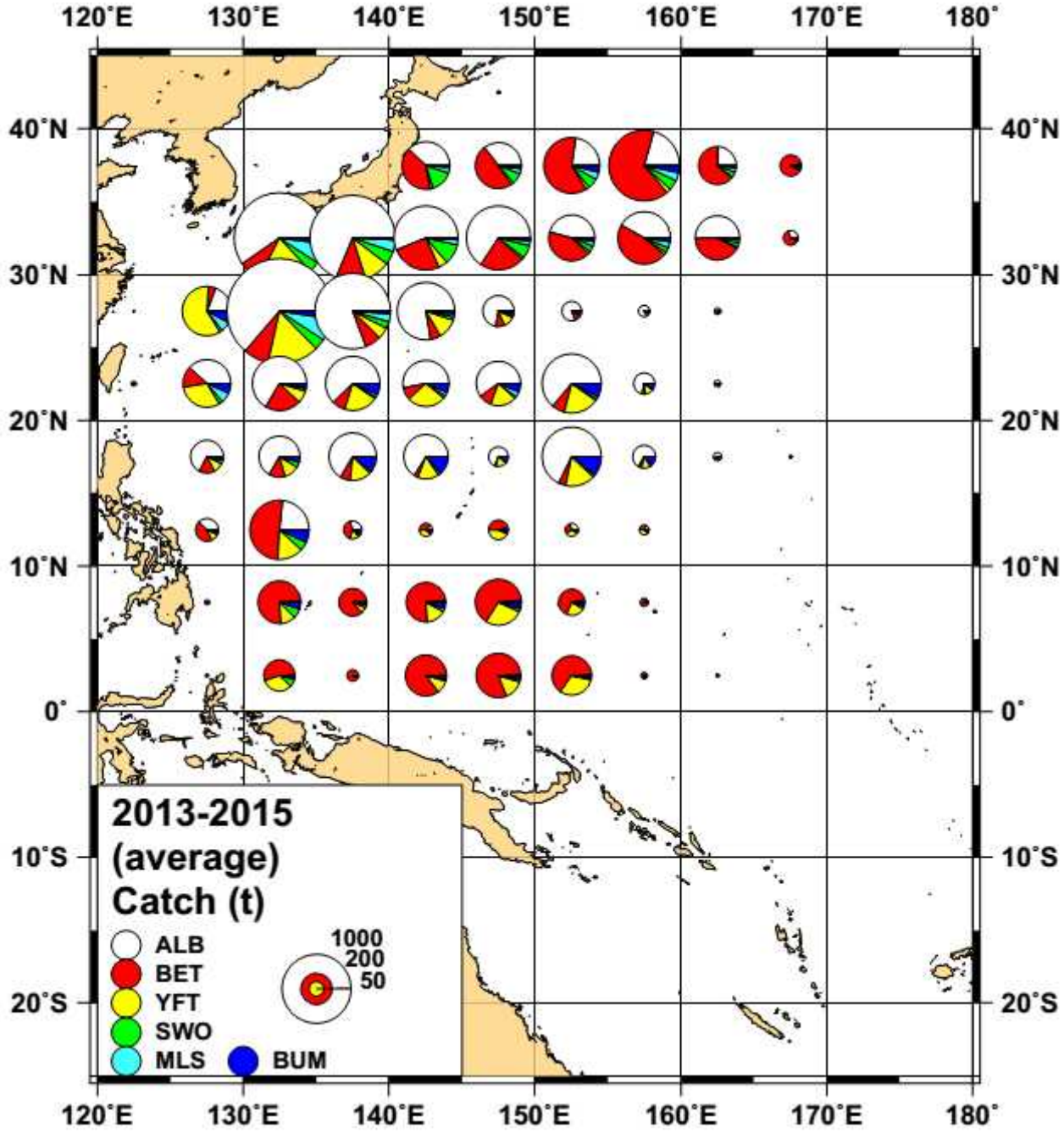

Fig. 6. Distributions of small offshore longline catch (in weight) by species in average of 2013-2015 for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BUM: blue marlin).

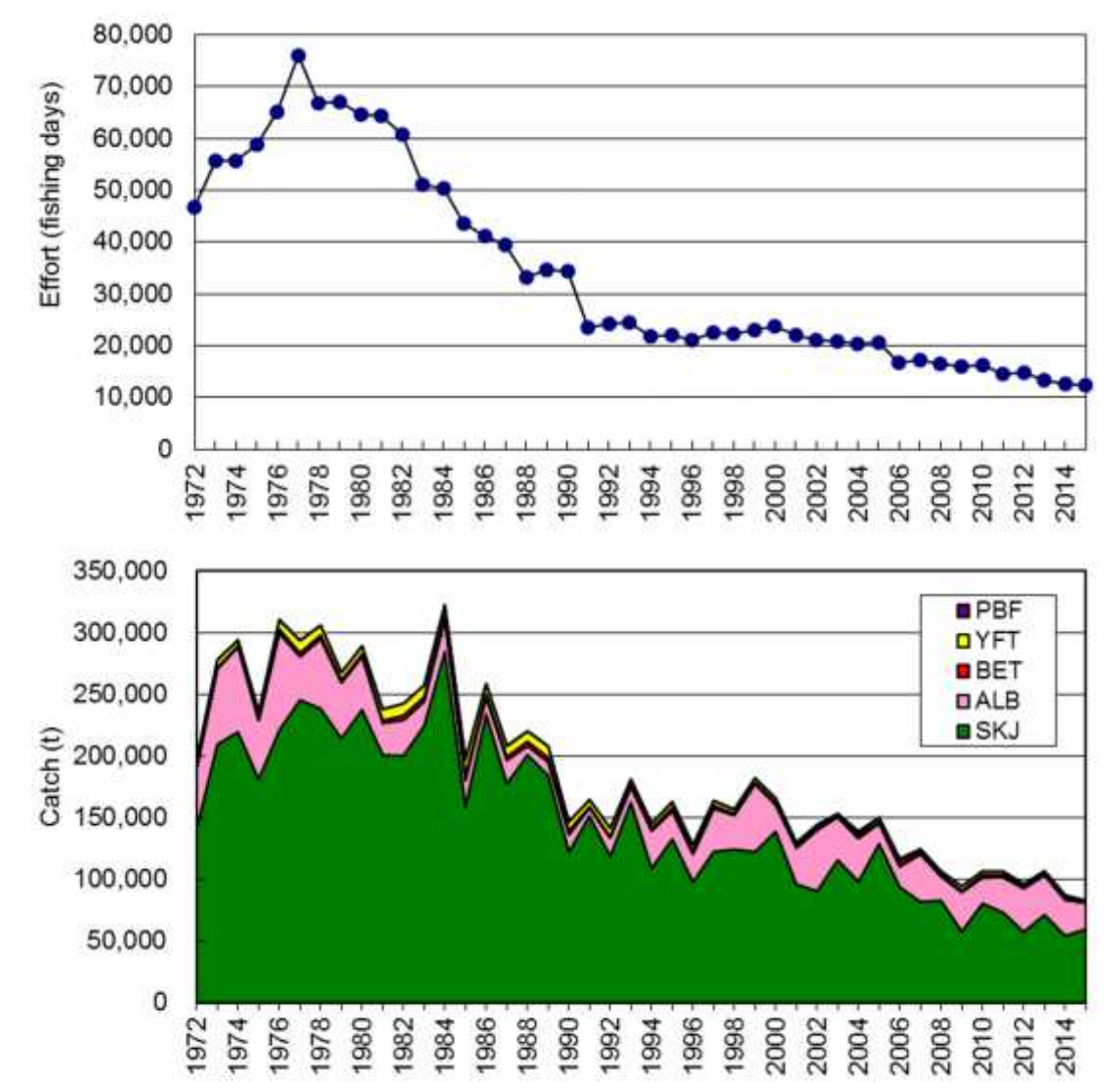

Fig. 7. Historical change of fishing effort and catches by species for the Japanese pole-and-line fishery (>20GRT) in the WCPFC Convention Area. Values in 2015 are provisional.

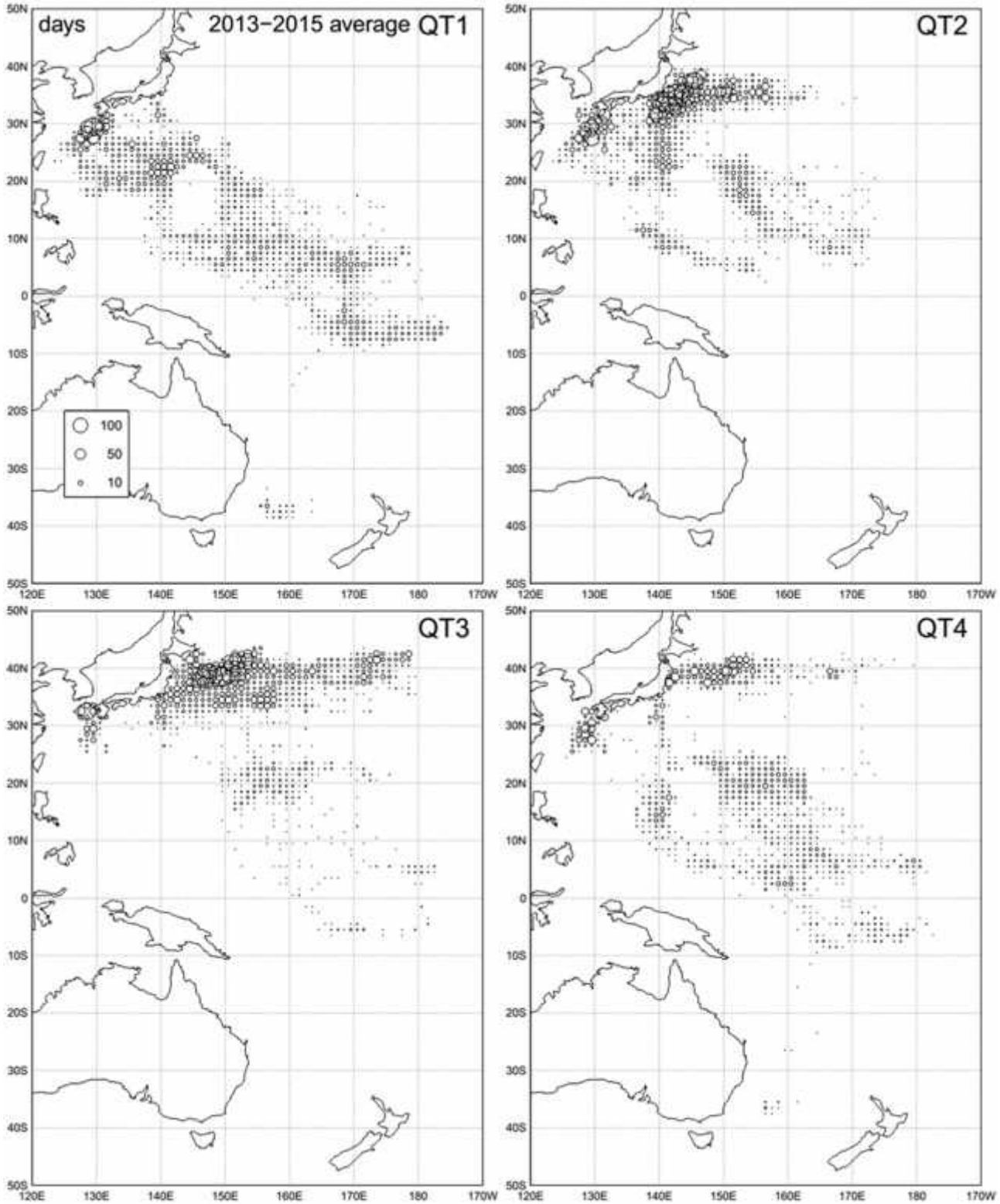

Fig. 8. Quarterly distribution of fishing effort (days) for the Japanese pole-and-line fishery (offshore and distant water licenses) in the Pacific Ocean in average of 2013-2015.

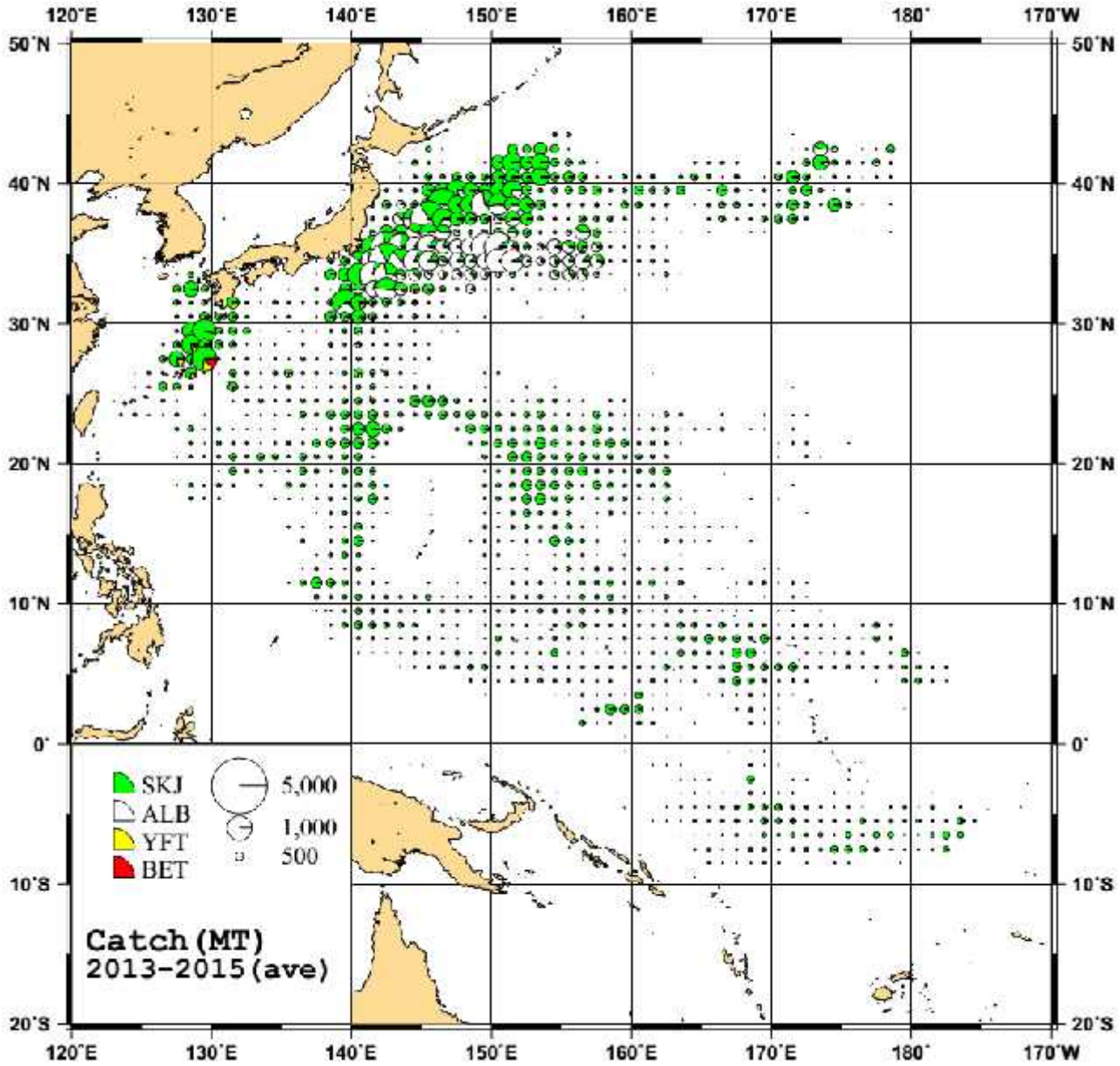

Fig. 9. Distribution of catch and its species composition for the Japanese offshore and distant water pole-and-line fishery in average of 2013-2015.

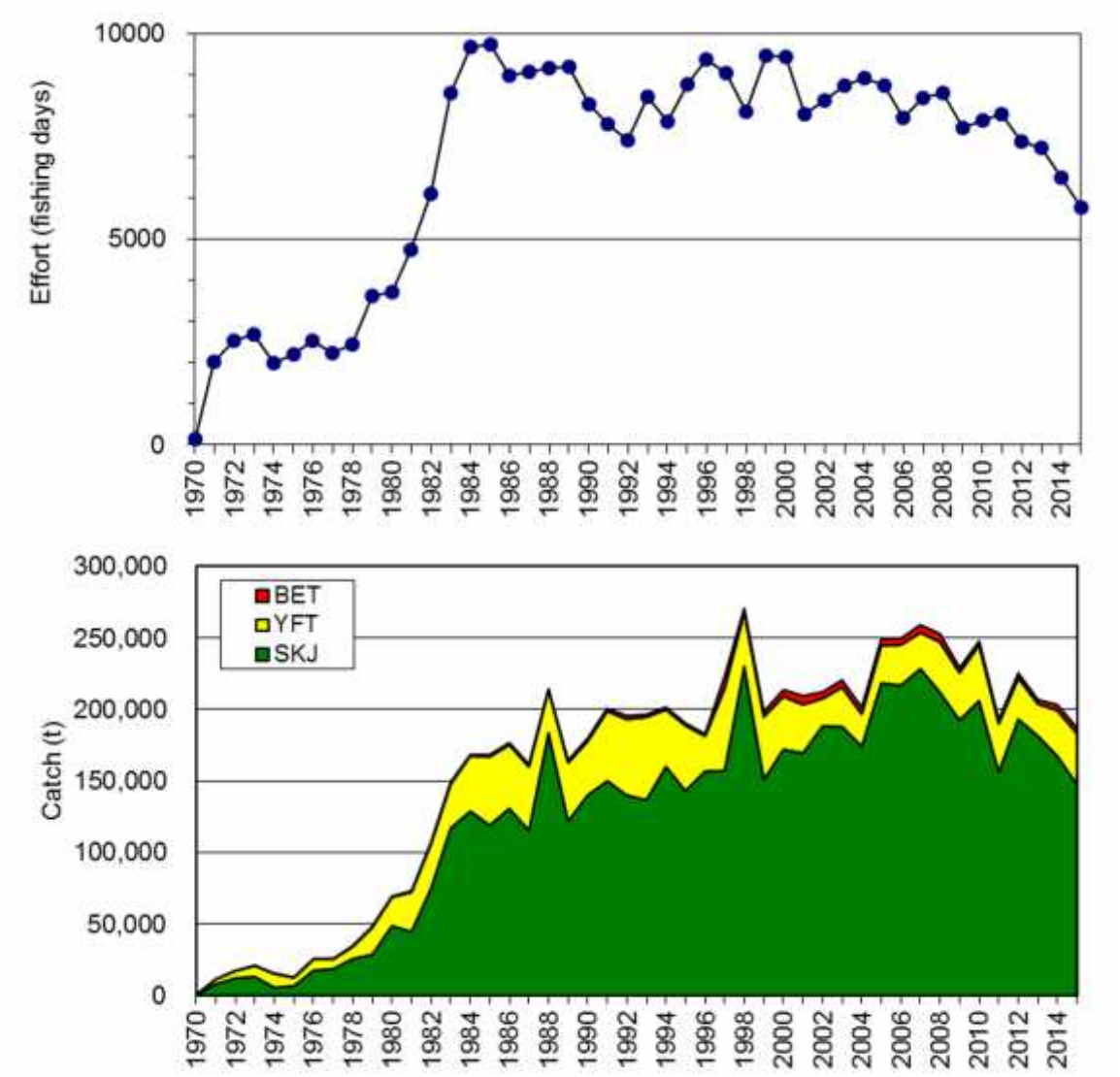

Fig. 10. Trends of fishing effort and catches by species for the Japanese tuna purse seine fishery in the WCPFC Convention Area. Values in and 2015 are provisional.

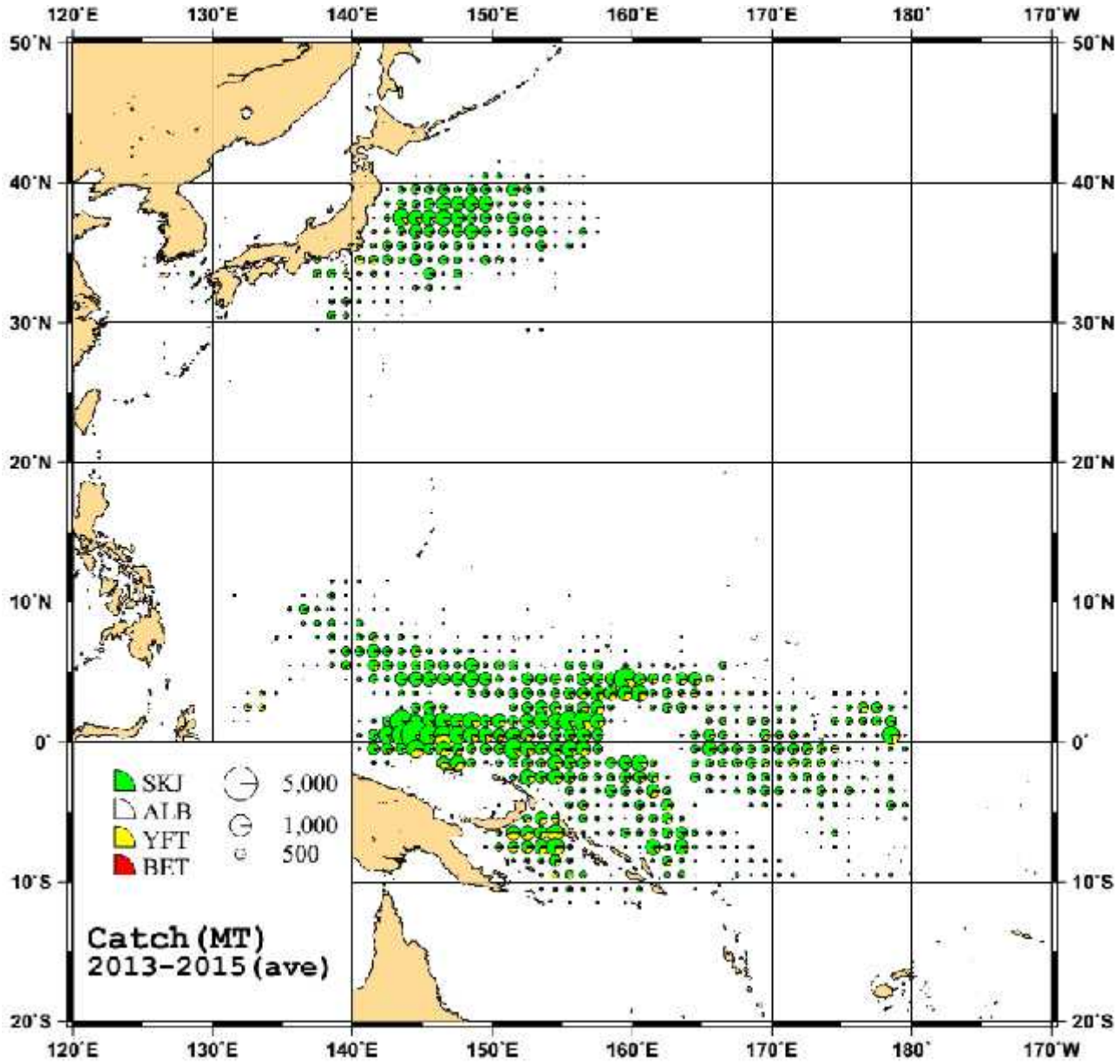

Fig. 11. Distribution of tuna purse seine catch (t) by species (skipjack, yellowfin and bigeye) combined for 2013-2015.

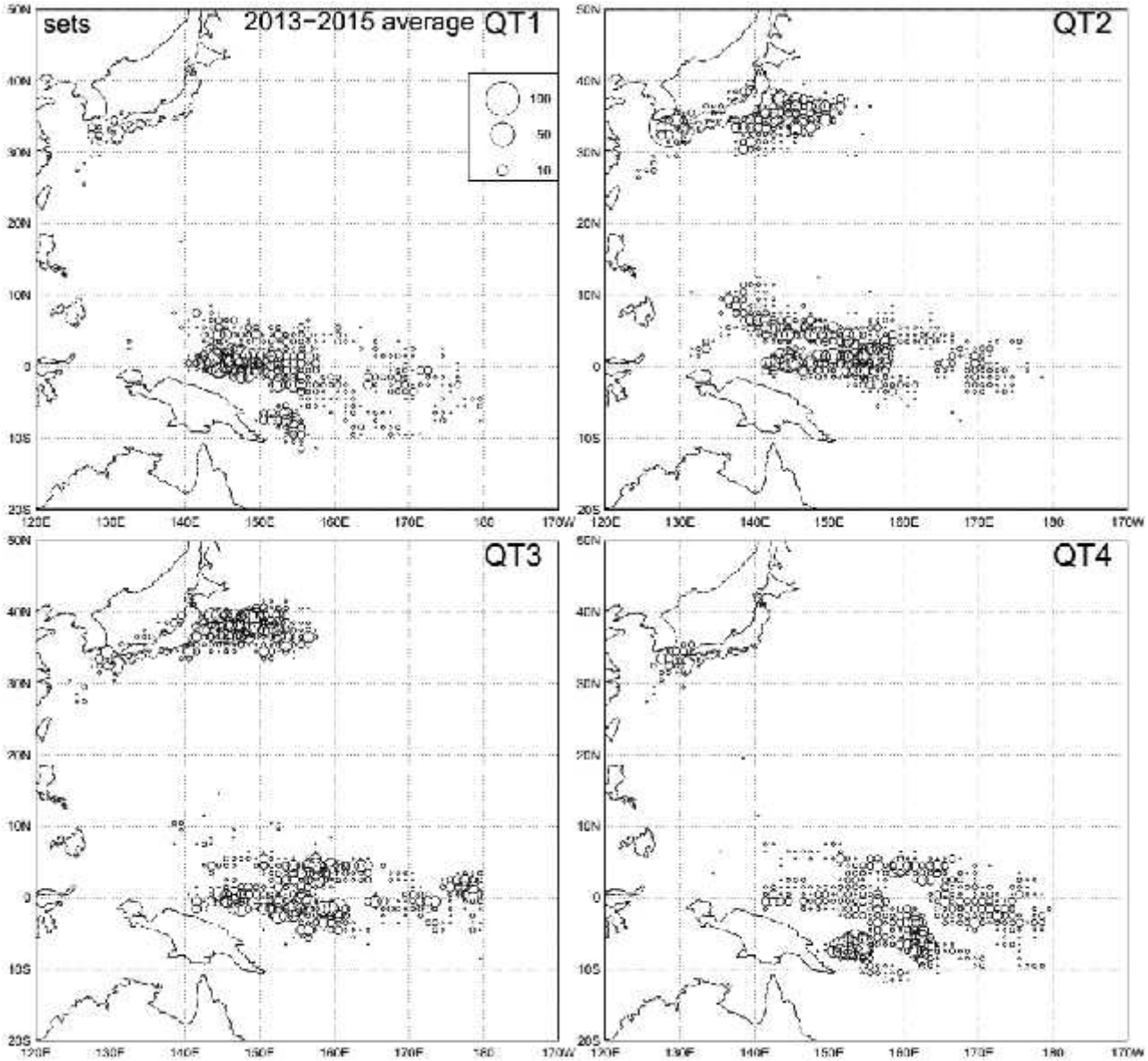

Fig. 12. Quarterly distributions of fishing effort (number of set) for the Japanese tuna purse seine fishery in the Pacific Ocean in 2013-2015.

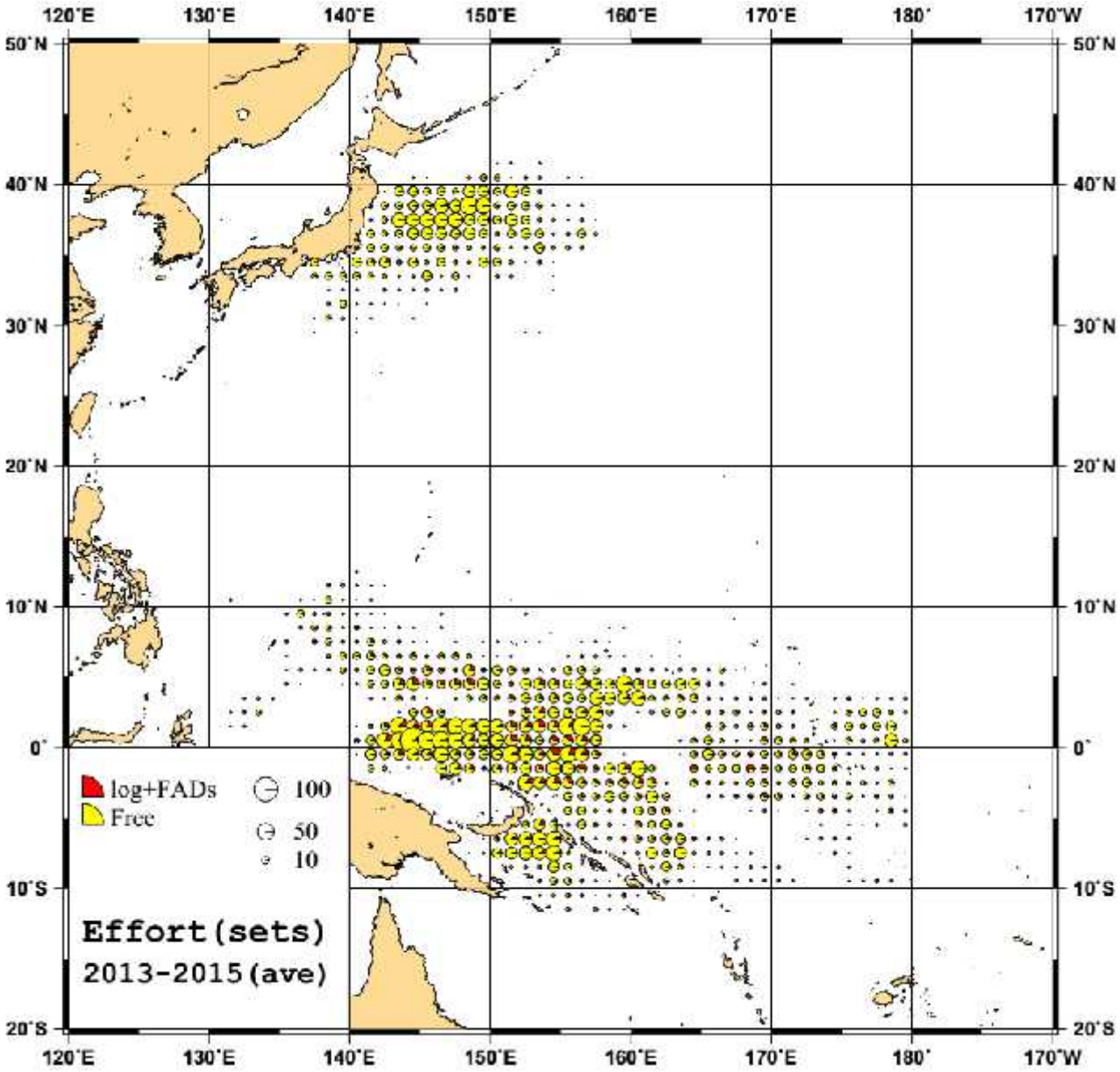

Fig. 13. Distribution of sets by type of school for 2013-2015 deployed by the tuna purse seine fishery by Japan.

Appendix Table 1. Catches (t) for tunas, billfishes and sharks in the portion of the WCPFC Convention Area east of the 150˚ meridian of west longitude caught by distant-water and offshore longline fisheries.

Year	BET	YFT	SKJ	BUM	BLM	BSH	LMD	POR	SMA	OCS	THR	O-shk
2011	1,144	244	4	45	1	87	0	1	22	9	2	11
2012	1,836	387	7	86	2	128	0	1	18	0	2	1
2013	1,436	332	8	120	2	50	0	1	5	0	3	1
2014	(787)	(210)	(2)	(68)	(1)	(29)	(0)	(0)	(1)	(0)	(0)	(0)
2015	(416)	(64)	(1)	(35)	(1)	(21)	(0)	(0)	(0)	(0)	(1)	(0)

Appendix Table 2. Catches (t) 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. Parenthesis represents provisional. In this table, definition of "Coastal longline" is vessel size less than 20 GRT, which is different from that in Table 5.Values in 2015 area provisional.

Pacific bluefin tuna (1) in the Pacific Ocean north of the Equator

Year	LL	LL	PL	PS	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	(unspecified)	(unspecified)			
2011	828	9	63	8340	1820	1651	283
2012	667	6	113	2462	570	1932	343
2013	777	7	8	2771	904	1415	529
2014	672	11	5	5456	1023	1907	499
2015	635	12	9	3364	462	1290	415

Pacific bluefin tuna (2) in the Pacific Ocean south of the Equator

Year	LL	LL	PL	PS	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	(unspecified)	(unspecified)			
2011	0	11	0	0	0	0	0
2012	0	8	0	0	0	0	0
2013	0	7	0	0	0	0	0
2014	0	4	0	0	0	0	0
2015	0	4	0	0	0	0	0

Pacific bluefin tuna (3) in the WCPFC Statistical Area north of the Equator

Year	LL	LL	PL	PS	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	(unspecified)	(unspecified)			
2011	828	9	63	8340	1820	1651	283
2012	667	5	113	2462	570	1932	343
2013	777	5	8	2771	904	1415	529
2014	672	10	5	5456	1023	1907	499
2015	635	11	9	3364	462	1290	415

Pacific bluefin tuna (4) in the WCPFC Statistical Area south of the Equator

Year	LL	LL	PL	PS	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	(unspecified)	(unspecified)			
2011	0	11	0	0	0	0	0
2012	0	8	0	0	0	0	0
2013	0	6	0	0	0	0	0
2014	0	4	0	0	0	0	0
2015	0	4	0	0	0	0	0

Pacific bluefin tuna (5) in the portion of the WCPFC Statistical Area east of the 150°meridian of west longitude

Year	LL	LL	PL	PS	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	(unspecified)	(unspecified)			
2011	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0

Appendix Table 2. (Continued)

Albacore (1) the Pacific Ocean north of the Equator

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2011	16098	4858	57	25647	18	462	12	443	50	78
2012	17668	5160	92	33650	72	4121	26	610	48	129
2013	15110	4729	61	33507	3	1985	14	302	36	211
2014	15701	4269	81	29352	0	2009	11	197	24	197
2015	12142	4095	81	21135	0	2009	11	197	24	197

Albacore (2) the Pacific Ocean south of the Equator

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2011	0	5355	0	9	0	0	0	0	0	0
2012	0	4583	0	15	0	0	0	0	0	0
2013	0	3667	0	8	0	0	0	0	0	0
2014	0	2392	0	0	0	0	0	0	0	0
2015	0	1753	0	0	0	0	0	0	0	0

Albacore (3) the WCPFC Statistical Area north of the Equator

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2011	16098	4721	57	25647	18	462	12	443	50	78
2012	17668	5004	92	33650	72	4121	26	610	48	129
2013	15110	4622	61	33507	3	1985	14	302	36	211
2014	15701	4211	81	29352	0	2009	11	197	24	197
2015	12142	3892	81	21135	0	2009	11	197	24	197

Albacore (4) the WCPFC Statistical Area south of the Equator

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2011	0	2630	0	9	0	0	0	0	0	0
2012	0	2581	0	15	0	0	0	0	0	0
2013	0	2157	0	8	0	0	0	0	0	0
2014	0	1546	0	0	0	0	0	0	0	0
2015	0	1166	0	0	0	0	0	0	0	0

Albacore (5) the portion of the WCPFC Statistical Area east of the 150°meridian of west longitude

Year	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water	Coastal	Offshore and distant-water	Coastal	Offshore and distant-water				
2011	0	104	0	0	0	0	0	0	0	0
2012	0	213	0	0	0	0	0	0	0	0
2013	0	141	0	0	0	0	0	0	0	0
2014	0	57	0	0	0	0	0	0	0	0
2015	0	39	0	0	0	0	0	0	0	0

Appendix Table 2. (Continued)

Swordfish (1) the Pacific Ocean north of the Equator

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	973	3046	193	2	245
2012	1080	2946	371	8	351
2013	921	3319	290	13	459
2014	1089	3279	269	7	293
2015	1076	3879	269	7	293

Swordfish (2) the Pacific Ocean south of the Equator

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	0	3437	0	0	0
2012	0	3915	0	0	0
2013	0	3528	0	0	0
2014	0	3627	0	0	0
2015	0	2983	0	0	0

Swordfish (3) the WCPFC Statistical Area north of the Equator

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	973	2356	193	2	245
2012	1080	2568	371	8	351
2013	921	2883	290	13	459
2014	1089	2823	269	7	293
2015	1076	3257	269	7	293

Swordfish (4) the WCPFC Statistical Area south of the Equator

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	0	641	0	0	0
2012	0	675	0	0	0
2013	0	538	0	0	0
2014	0	393	0	0	0
2015	0	354	0	0	0

Swordfish (5) the portion of the WCPFC Statistical Area east of the 150°meridian of west longitude

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	0	250	0	0	0
2012	0	266	0	0	0
2013	0	227	0	0	0
2014	0	126	0	0	0
2015	0	89	0	0	0

Appendix Table 2. (Continued)

striped marlin (1) the Pacific Ocean north of the Equator

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	932	319	347	30	113
2012	980	326	597	52	96
2013	1099	358	336	39	86
2014	846	265	173	39	53
2015	945	292	173	39	53

striped marlin (2) the Pacific Ocean south of the Equator

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	0	764	0	0	0
2012	0	759	0	0	0
2013	0	600	0	0	0
2014	0	545	0	0	0
2015	0	298	0	0	0

striped marlin (3) the WCPFC Statistical Area north of the Equator

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	932	205	347	30	113
2012	980	261	597	52	96
2013	1099	249	336	39	86
2014	846	191	173	39	53
2015	945	195	173	39	53

striped marlin (4) the WCPFC Statistical Area south of the Equator

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	0	237	0	0	0
2012	0	164	0	0	0
2013	0	157	0	0	0
2014	0	119	0	0	0
2015	0	89	0	0	0

striped marlin (5) the portion of the WCPFC Statistical Area east of the 150°meridian of west longitude

Year	LL	LL	Gillnet	Setnet	Others
	Coastal less than 20 GRT	Offshore and distant-water			
2011	0	21	0	0	0
2012	0	29	0	0	0
2013	0	23	0	0	0
2014	0	18	0	0	0
2015	0	6	0	0	0

Appendix Table 3. Albacore catch in mt and fishing effort in fishing days in the WCPCA north of the Equator. Figures in parentheses indicate provisional data. That was request written in paragraph 4 of CMM-2005-03.

(a) Catch

Year	LL Coastal	LL Offshore & distant-water	PL Coastal	PL Offshore & distant-water	PS Coastal	PS Offshore & distant-water	Gillnet	Troll	Setnet	Others
2011	16098	4858	57	25647	18	462	12	443	50	78
2012	17668	5160	92	33650	72	4121	26	610	48	129
2013	15110	4729	61	33507	2	1985	14	302	36	211
2014	15701	4269	81	29352	0	2009	11	197	24	196
2015	12142	4095	81	21135	0	2009	11	197	24	196

(b)Effort

Year	LL Coastal	LL Offshore & distant-water	PL Coastal	PL Offshore & distant-water	PS Coastal	PS Offshore & distant-water	Gillnet	Troll	Setnet	Others
2011	42996	12683	NA	13433	NA	7596	NA	NA	NA	NA
2012	38977	13818	NA	14646	NA	8449	NA	NA	NA	NA
2013	37529	13406	NA	12781	NA	7518	NA	NA	NA	NA
2014	35362	13305	NA	12147	NA	6996	NA	NA	NA	NA
2015	29029	12058	NA	12195	NA	7357	NA	NA	NA	NA

Appendix Table 4. Sstriped marlin catch for the Japanese offshore and distant water longline fishery in the WCPCA south of 15˚S. This table was request written in paragraph 4 of CMM-2006-04

Year	Striped marlin catch (t)
2011	203
2012	134
2013	124
2014	98
2015	79

Appendix Table 5. Catch in weight, of swordfish at south of 20° South of WCPFC statistical area by year with vessel statistics. "Vessel number" means number of vessels who caught at least one fish in this area in each year. Figures in parentheses indicate provisional data. That was request written in paragraph 8 of CMM-2009-03.

Year	Japan-flagged vessels south of 20S		Chartered vessels		Other vessels fishing within the Japan's waters south of 20S		
	Catch (mt)	Vessel numbers	Catch (mt)	Vessel numbers	Flag	Catch (mt)	Vessel numbers
2011	267	34	0	0	--	--	--
2012	297	29	0	0	--	--	--
2013	235	28	0	0	--	--	--
2014	235	26	0	0	--	--	--
2015	225	26	0	0	--	--	--

Appendix Table 6-1. The total quantity (mt) of highly migratory fish stocks transshipped by fishing vessels in 2015. That was request written in **paragraph 8 of CMM-2009-06**.

1. Offloaded by Japanese longliners

1.1. By species

1.1.1 Catch inside the CA

	Port inside the CA	HS inside the CA	Port outside the CA	HS outside the CA
Bigeye	0	469	0	283
Yellowfin	0	78	0	41
Swordfish	0	119	0	28
Others	0	216	0	95
Total	0	762	0	448

1.1.2. Catch outside the CA

	Port inside the CA	HS inside the CA
Bigeye	0	267
Yellowfin	0	35
Swordfish	0	72
Others	0	41
Total	0	416

1.2. by product form

1.2.1. Catch inside the CA

	Port inside the CA	HS inside the CA	Port outside the CA	HS outside the CA
Gilled and Gutted	0	556	0	327
Gutted and Headed	0	46	0	8
Whole	0	35	0	28
Fillets	0	0	0	19
Others	0	124	0	67
Total	0	762	0	447

1.2.2. Catch outside the CA

	Port inside the CA	HS inside the CA
Gilled and Gutted	0	312
Gutted and Headed	0	4
Whole	0	9
Fillets	0	33
Others	0	58
Total	0	416

Appendix Table 6-1. (Continued)

2. Received by Japanese carriers from longliners.
2.1. By species
2.1.1 Catch inside the CA

	HS inside the CA	HS outside the CA
Bigeye	0	0
Yellowfin	0	0
Swordfish	0	0
Others	0	0
Total	0	0

2.1.2. Catch outside the CA

	HS inside the CA	Port inside the CA
Bigeye	0	0
Yellowfin	0	0
Swordfish	0	0
Others	0	0
Total	0	0

Appendix Table 6-2. The number of transshipments involving highly migratory fish stocks in 2015. That was request written in **paragraph 8 of CMM-2009-06**.

1. Offloaded by Japanese longliners
1.2. The number of transhipment

	Port inside the CA	HS inside the CA	Port outside the CA	HS outside the CA
Caught inside the CA	0	8	0	1
Caught both inside and outside the CA	0	10	0	8
Caught outside the CA	0	2	0	2
Total	0	20	0	11

2. Received by Japanese carriers from longliners.
2.2 The number of transhipment

	HS inside the CA	HS outside the CA
Caught inside the CA	0	0
Caught both inside and outside the CA	0	0
Caught outside the CA	0	0
Total	0	0

Appendix Table 7. Fishing effort and albacore catch for the Japanese offshore and distant water longline fishery in the south of 20S in the WCPCA. This table was request written in **paragraph 4 of CMM-2010-05**.

(a) Offshore and distant water longline

Year	Albacore catch (mt)
2011	1803
2012	1321
2013	1417
2014	(1405)
2015	(857)

(b) Offshore and distant water pole-and-line

Year	Vessels	Albacore catch (mt)
2011	2	9
2012	3	15
2013	2	8
2014	(1)	(0)
2015	(3)	(0)

Appendix Table 8. Catch (mt) for shark species in the WCPFC Convention Area by species for the Japanese distant and offshore (top table) and small offshore (bottom table) longline fisheries. Figures in the parentheses indicate provisional data. The catch for salmon shark and porbegle was counted only in south of 20° south. By 2012, catches of silky shark, hammerhead sharks and whale shark are included in other shark. This table was request written in **paragraph 4 of CMM-2010-07**.
BSH: Blue shark, LMD: Salmon shark, POR: Porbeagle shark, SMA: Shortfin mako shark, OCS: Oceanic white-chip shark, THR: Thresher sharks nei, FAL: Silky sharks, SPN: Hammerhead sharks nei, RHN: Whale shark, O-shk: other sharks

Distant water and offshore longlines

Year	BSH	LMD	POR	SMA	OCS	THR	FAL	SPN	RHN	O-shk
2011	6,848	62	3	714	268	192	-	-	-	142
2012	10,860	467	1	751	46	84	-	-	-	27
2013	9,603	205	1	606	0	143	-	-	-	124
2014	(9,882)	(741)	8	(707)	(0)	(126)	(0)	(0)	(0)	(4)
2015	(10,674)	(662)	(1)	(662)	(0)	(67)	(0)	(0)	(0)	(1)

Small offshore longline

Year	BSH	LMD	POR	SMA	OCS	THR	FAL	SPN	RHN	O-shk
2011	459	12	0	24	0	0	-	-	-	12
2012	524	78	0	3	0	0	-	-	-	9
2013	763	169	0	21	0	15	-	-	-	5
2014	(736)	(268)	(0)	(5)	(0)	(2)	(0)	(0)	(0)	(91)
2015	(468)	(368)	(0)	(1)	(0)	(2)	(0)	(0)	(0)	(3)

Appendix Table 9. The estimated and observed number of released oceanic whitetip shark on longline vessels in 2015. The estimated number of release was calculated by raising observed number to total number based on the observer coverage ratio in 2015 (see Appendix Table 13). This table was request written in **paragraph 3 of CMM-2011-04**.

	Observed (number)	Estimated (number)
Alive	1	13
Dead	15	192

Appendix Table 10-1. Effort, observed and estimated seabird captures by the longliner larger than 20 GRT (approximately >=24m) by fishing year [South of 30˚S; 25˚S - 30˚S, 23˚N - 25˚S, or North of 23˚N]. For each year, the table gives the total number of hooks; the number of observed hooks; observer coverage (the percentage of hooks that were observed); the number of observed captures (both dead and alive); the capture rate (captures per thousand hooks). Figures in parenthesis indicate provisional data. This table was request written in **paragraph 9 in the part of seabirds of CMM-2012-07**.

South of 30S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2015	26	5,313,109	883,807	16.6%	506	0.573

25S - 30S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2015	14	1,284,223	27,558	2.1%	1	0.036

23N - 25S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2015	84	21,280,884	490,648	2.3%	2	0.004

North of 23N

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2015	48	14,187,611	412,667	2.9%	72	0.174

Appendix Table 10-2. Effort, observed and estimated seabird captures by the longliner less than 20 GRT (approximately <24m) by fishing year [South of 30˚S; 25˚S - 30˚S, 23˚N - 25˚S, or North of 23˚N]. For each year, the table gives the total number of hooks; the number of observed hooks; observer coverage (the percentage of hooks that were observed); the number of observed captures (both dead and alive); the capture rate (captures per thousand hooks). Figures in parenthesis indicate provisional data. This table was request written in **paragraph 9 in the part of seabirds of CMM-2012-07**.

23N - 25S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2015	205	52,889,144	1,122,259	2.1%	1	0.001

North of 23N

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2015	205	52,889,144	1,122,259	2.1%	215	0.192

Appendix Table 11-1. Number of observed seabird captures in the longliner larger than 20 GRT (approximately >=24m), 2015, by species and area. This table was request written in **paragraph 9 in the part of seabirds of CMM-2012-07**.

Species	South of 30˚S	25˚S-30˚S	23˚N-25˚S	North of 23˚N	Total
Wandering albatross	12	0	0	0	12
Gibson's albatross	4	0	0	0	4
Wandering albatross group	14	1	0	0	15
Black-browed albatross	2	0	0	0	2
Campbell albatross	27	0	0	0	27
Black-browed albatross group	12	0	0	0	12
Buller's albatross group	129	0	0	0	129
Shy-type albatrosses	161	0	0	0	161
Light-mantled albatross	6	0	0	0	6
Unidentified albatrosses	50	0	0	26	76
Laysan albatross	0	0	0	30	30
Black-footed albatross	0	0	0	16	16
Northern giant petrel	1	0	0	0	1
White-chinned petrel	65	0	0	0	65
Grey petrel	1	0	0	0	1
Westland petrel	3	0	0	0	3
Flesh-footed shearwater	1	0	0	0	1
Sooty shearwater	1	0	0	0	1
Unidentified petrels	8	0	0	0	8
Unidentified birds	9	0	2	0	11
Total	506	1	2	72	581

Appendix Table 11-2. Number of observed seabird captures in the longliner less than 20 GRT (approximately <24m), 2015, by species and area. This table was request written in **paragraph 9 in the part of seabirds of CMM-2012-07**.

Species	South of 30˚S	25˚S-30˚S	23˚N-25˚S	North of 23˚N	Total
Laysan albatross	-	-	0	116	116
Black-footed albatross	-	-	0	70	70
Unidentified albatrosses	-	-	0	22	22
Streaked shearwater	-	-	0	2	2
Flesh-footed shearwater	-	-	1	0	1
Unidentified petrels	-	-	0	2	2
Unidentified birds	-	-	0	3	3
Total	-	-	1	215	216

Appendix Table 12. The estimated and observed number of released silky shark on longline vessels in 2015. The estimated number of release was calculated by raising observed number to total number based on the observer coverage ratio in 2015 (see Appendix Table 13). This table was request written in **paragraph 3 of CMM-2013-08**.

	Observed (number)	Estimated (number)
Alive	168	3,234
Dead	125	2,075

Appendix Table 13. Tentative observer coverage for the Japanese longline fishery for 2015 as of July 1, 2016. This table was request written in **paragraph 4 of CMM-2007-01**.

CCM Fleet	Fishery	No. of Hooks			Days Fished			Days at Sea			No. of Trips		
		Total estimated	Observer	%	Total estimated	Observer	%	Total estimated	Observer	%	Total estimated	Observer	%
Japan	Ice/Fresh, short-trip				28,597	1,226	4.29%						
	Frozen, long-trip				8,298	647	7.80%						