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PART 1: INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

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

National Tuna Fisheries Report of Japan

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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. During the 2016–2021, the number of Japanese commercial longline vessels shows a declining trend, and the total number of pole-and-line vessels (larger than 20 GRT) and has also decreased, while the total number of purse seine vessels which are engaged in tuna fishery shows no clear trend. The total 2021 WCP-CA catch of tunas (Pacific bluefin, albacore, bigeye, yellowfin and skipjack) by the Japanese fisheries (longline, pole-and-line, purse seine and miscellaneous fisheries) was still provisional and estimated to be 336,397 mt, and this is corresponding to 112% of 2020 total tunas catch (299,242 mt). In 2021, the total tuna catch by the purse seine fishery was 199,018 mt (59% of the total), with 97,932 mt (29%) by the pole-and-line fishery, 29,934 mt (9%) by the longline fishery, and the remaining (3%) by the other gears. Japan has conducted several research activities in relation to biological and stock assessment studies on tunas, tuna-like species and other bycatch species in the WCP-CA in 2021 and early 2022 such as several research cruises on larvae/juvenile sampling for Pacific bluefin 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, which 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, tables which are requested by CMMs were given in the Appendix Tables.

2. Data source

The Fisheries Research Institute (FRI) is responsible for compiling catch and effort statistics for major fisheries (pole-and-line vessels larger than 20 gross tonnage (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 2016–2020 data (MAFFJ 2016–2020) and presented in this paper. The statistics of the last two years (2020 and 2021) are provisional in this report.

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 2016–2021 period (coastal longline vessels were not included). As this number of active vessels is estimated based on logbook submitted, some vessels which actually operated but did not submit logbook yet 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 330 vessels in 2016 to 270 in 2021 in total. The number of vessels for each category, 10–49 GRT (more than 10 and less than 50 GRT), 50–99 GRT, 100–199 GRT and over 200 GRT, generally decreased.

The total number of pole-and-line vessels (larger than 20 GRT) has decreased during the 2016–2021. The number of vessels for category 50‑199 GRT decreased from 50 in 2016 to 35 in 2021, corresponding to 30% decrease. The number of vessels for category over 200 GRT ranged from 22 to 31 without apparent trend during the period.

The total number of purse seine vessels which are engaged in tuna fishery ranged from 69 to 75 without apparent trend during the 2016–2021 period. The number of vessels of 50–199 GRT showed slight decreasing trend during the period. The number of vessels of 200–499 GRT shows a decreasing trend during the period and reached to 29 in 2021. 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 29 in 2021 .

4. Trends in catch and effort

The total 2021 WCP-CA catch of tunas (Pacific bluefin, albacore, bigeye, yellowfin and skipjack) by the Japanese fisheries (longline, pole-and-line, purse seine and miscellaneous fisheries) was still provisional and estimated to be 336,547 mt, and this is corresponding to 112% of 2020 total tunas catch (299,386 mt). In 2021, the total tuna catch by the purse seine fishery was 199,018 mt (59% of the total), with 97,932 mt (29%) by the pole-and-line fishery, 29,928 mt (9%) by the longline fishery, and the remaining (3%) 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. The coastal longliners, whose size is less than 19 GRT, are allowed to fish only in Japan's EEZ. The offshore longline vessels are further divided into two categories, small offshore ones, 10–19 GRT, and offshore ones, 10–119 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 10‑19 GRT, most vessels of the latter category (10–119 GRT) 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 tuna RFMOs.

Most recent statistics available are 2021 data, though the 2020 and 2021 data were 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 2016 to 2021 are shown in Table 2A. Historical changes in fishing effort and catch by species for this fishery are shown in Figs. 1 and 2, respectively, for the years 1971‑2021. 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 was more than 200 million hooks during the 1971–1990 period, and then decreased to less than 100 million hooks in 2005, furthermore decreased to less than 50 million hooks after 2015 and decreased to 30 million hooks in 2021. (Table 2A). Primary target species for the longline catch are yellowfin and bigeye historically. The yellowfin catch was around 60,000 mt at a peak during the late 1970s and the early 1980s and since declined continuously to about 5,000 mt or less in the recent years (Fig. 2). The bigeye catch was relatively stable during the 1970s and 1980s ranging between 30,000 and 50,000 mt, and then decreased to between 20,000 and 30,000 mt during the mid–1990s to early 2000s. Further, the bigeye catch continued to decrease to 20,000 mt around 2005 and reached to around 3,000 mt in recent years. The bigeye catch in 2021 was 2,355 mt which is 58% of the 5–years average catch (2016–2020) of this species. The yellowfin catch in 2021 was 3,636 mt which is 72% of the 5–years average catch (Table 2). The average quarterly effort distribution of distant water and offshore longline vessels during the 2019–2021 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 was dominant species near Japan, albacore was abundant in the middle latitudes between 15‑30 ˚N and 25‑40 ˚S, and tropical tunas (mostly bigeye and yellowfin) were caught in the equatorial waters.

As for the small offshore longline fishery, catch by species in the WCP-CA during the 2016–2021 period is shown in Table 2B. The total number of hooks deployed by the small offshore longline fishery decreased from 69,360 thousand hooks in 2016 to 66,144 in 2020 and it was 49,667 thousand hooks in 2021. The bigeye catch for the small offshore longline show no apparent trend in this period. The bigeye catch was 4,217 mt in 2021, which is 58% of that in the average of previous 5 years. The yellowfin catch of the fishery in recent five years was stable around 4,800 mt. The yellowfin catch in 2021 was 4,287 mt which is 88% of the recent 5-years average. Geographical distributions of fishing efforts and catches by species of the fishery are shown in Figs. 5 and 6, respectively. At the area between 130‑150 ˚E and north of 15 ˚N, albacore is dominant in the catch while bigeye catch is dominant from 140˚‑160 ˚E and from 30 ˚‑40 ˚N. In the south of 15˚N, bigeye and yellowfin tunas were 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 2016–2021. In addition to this, historical changes in catch by species and effort are shown in Fig. 7 for the period of 1972–2021. The data for 2020 and 2021 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 and effort show decreasing trend with fluctuations. 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 a major part of catches followed by albacore and yellowfin. The number of fishing days exceeded 60,000 in the 1970s, but it is less than 18,000 days from 2006 onward.

During the 2016–2021 period, the number of fishing days (including no catch days) for this fishery shows no apparent trend. The number of fishing days was 8,733 in 2021 which is 68% of that in the average of the previous 5 years. (Table 3). The total catch of tunas (skipjack, bigeye, yellowfin and albacore) in 2021 was 95,824 mt, which is 121% of that in the average of the previous 5 years. The skipjack catch was 56,980mt in 2021, which is 99% of that in the average of the previous 5 years.

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 2019–2021. 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, 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 2016 to 2021. In addition to this, historical changes in catch by species and effort are shown in Fig. 10 for the period of 1970–2021. The data for 2020 and 2021 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 a major part of catches followed by yellowfin.

During the 2016–2021 period, the number of fishing days (including only searching) for this fishery shows a declining trend, while the number of fishing days was 5,748 in 2021 which is 99% of that in the average of previous 5 years (Table 4). The total catch of the purse seine fishery is fluctuating during the period. The total catch in 2021 was 176,528 mt which is 106% of the average of previous 5 years. Skipjack catch for this fishery was 141,541 mt in 2021, which is 112% of that in the average of the previous 5 years. Yellowfin catch for this fishery was 33,066 mt in 2021, which is 89% of that in the average of the previous 5 years.

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 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 that encircled cetaceans is currently being added up. According to the reports of the master of a vessel/observer, the number of cases that Japanese tuna purse seine encircled a cetacean unintentionally was 21 times.

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 catch by species and fishery during the 2016–2021 is shown in Table 5. The figures in 2020 and 2021 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, however, 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 is 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, but skipjack catch by troll along the Pacific coast in the western Japan has been very low 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 2016–2021. The data in 2020 and 2021 are preliminary. The total catch of skipjack shows a increasing trend during this period from 198,943 mt in 2016 to 210,519 mt in 2021. The total catch of bigeye shows a declining trend during this period from 15,074 mt in 2016 to 10,340 mt in

2021. The total catch of yellowfin shows an decreasing trend during this period from 57,012 mt in 2016 to 49,635 mt in 2021.

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 must submit it by each cruise within 30 days after the end of cruise 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 essential 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 several 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 %. The coverage rate for the combined both of distant water and offshore longline fisheries (20‐120 GRT, excluding 10‐20 GRT vessels that operate outside of the Japanese EEZ) has been about 90 – 95% of total operation since 1994, The coverage rate by fishery category for recent years is shown in 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 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 operations by prefecture (which the vessel belongs to) by year given by MAFFJ has been used to raise the log sheet data to the total catch. Since 2008, Vessel Monitoring System (VMS) information is utilized to raise the log sheet data. As for the small offshore longline, although reliable information of coverage rate had been available until 2007, it became possible to raise for the data of 2008 onward due to the utilize of VMS. But reliable information of coverage rate is not available for the coastal longline yet.

Since the catch in weight in log sheet is in processed weight, so that conversion factors by species are used to convert processed weight to whole weight.

An electric logbook system had been available since November 2016 for only distant water longline fishery. It allows for fishermen to fill out logbook in electric file and submit the electric file of logbook through web site to the server running by the Fishery Agency of Japan. Fishermen is moving to change from the ordinary log sheet by paper to the electric logbook system.

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 end of cruise. The log sheets submitted to the government are forwarded to the FRI 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 (1970s), 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 FRI 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 FRI used to compile the logbook data only for the tuna caught 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 FRI 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 had been voluntarily collected for all tunas and billfishes by fishermen who were on board distant water longline vessels. Fishermen recorded the data in the field note which was provided by the FRI, and sent the field note back to the FRI after the completion of the cruise. The length data reported by the at-sea sampling was 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 took measurement at an interval of 2cm or 5cm though the FRI encouraged measurement at an interval of 1cm. The length data provide from fishermen in this way is available until 2014.

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 FRI. 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 FRI. 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 largest percentage of size sampling which the FRI 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 unique 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.

The followings are species, types of gear/fishery and locations of sampling site for port sampling conducted in 2021.

- Size data was collected for albacore and skipjack caught by distant water pole-and-line vessels by the FRI staff at Yaizu.
- Size data was collected for skipjack caught by the middle-sized pole-and-line vessels which unload unfrozen fishes at Kesennuma by the FRI staff.
- Size data was collected for albacore, swordfish and striped marlin and sharks caught by the offshore longline and pole-and-line vessels at Kesennuma
- Size and sex data were collected for blue shark, shortfin mako, salmon shark and other species caught by offshore, small-scale offshore and coastal longline vessels and gillnet fishing vessel at Kesennuma. Majority of measurement was for blue shark and shortfin mako (details are described in FRI 2022). For blue shark, subsampling (about 2–3 individuals) was conducted for each container and shortfin mako was landed by individuals and measurement was conducted as much as possible.
- 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. In 2021, the observer program for the purse seiners was temporarily suspended due to the COVID–19 pandemic.

The observer program for longliners in the WCP-CA was started in 2008. The information on fishing vessels, fishing operations and all the catches in each operation were collected and most of retrieved animals were measured as much as observer could. One cruise of a small offshore longline vessel was observed in the 2021 calendar year. The data from the cruise was inputted to the database. The number of operations and catches by species and species groups are shown in Table 8.

The number of the observer deployment in 2021 had also been temporarily reduced compared to pre–2019 due to COVID–19 pandemic. Therefore, it should be noted that the reported data were very small and statistical consideration should be given when interpreting those data.

6.2. Tagging

Skipjack tagging

The FRI has been conducting skipjack tagging research mainly to investigate migration patterns around the fishing ground off Japan. One offshore pole-and-line vessel (20-119 GRT) and one distant water pole-and-line vessel (> 199 GRT) were fully chartered to conduct the research off Japan in October and November 2021 and in tropical areas (5°-25°N, 140°-180°E) in January and February 2022, respectively. A total of 7,700 skipjack tuna (1,199 off Japan and 6,501 in tropical areas) including 384 individuals (216 off Japan and 168 in tropical areas) with archival tags (Lotek LAT2910) were released. In addition, skipjack tagging has been conducted in cooperation with Ajinomoto Co., Inc. in the coastal area of southwestern Japan since 2009. In 2021, skipjack tuna tagging was planned, however, the tagging was postponed due to the COVID-19 pandemic.

Besides above studies, five research/training cruises on pole-and-line vessels conducted skipjack tagging in 2021 around off Japan areas. A total of 491 skipjack tuna including 33 individuals with archival tags were released in the south off Japan, around Izu Islands, around Hachijo Island (33˚N, 139˚E), and Wakayama (33.15˚N, 135.75˚E), and Okinawa (28.20˚N, 128.22˚E).

Shark and swordfish tagging

FRI has conducted tagging for sharks and swordfish, in order to investigate the migration pattern and habitat use of these species.

In 2020, FRI and NOAA (Pacific Islands Fisheries Science Center) launched a collaborative study on the seasonal migration of blue sharks in the central North Pacific Ocean using popup satellite archival tags (PSATs). In 2021 and 2022, data from five and three individuals was retrieved, respectively.

In 2021, PSATs were attached to blue shark, shortfin mako, and swordfish and SPOT were attached to blue sharks in the cruise of chartered vessel which operated shallow-set longline in the Northwestern Pacific.

6.3. Research cruise conducted

PBF larval/juvenile sampling

Since 2011, larval and juvenile surveys have been conducted to estimate current main spawning area and period of PBF. In 2021, research cruises were designed to focus on ecological studies of larval/juvenile PBF by R/Vs Shunyo-Maru, Yoko-Maru, Hokko-Maru and four prefectural R/Vs. Surveys for larval/juvenile PBF were conducted in the south of Japan around Nansei Islands area, where is a major spawning ground of PBF, from May to August and also in the Sea of Japan, which is another spawning ground of PBF, from July to August. In addition to these two spawning grounds, the survey was conducted in Joban area in the coastal area of northeastern Japan in July and August, where is recognized as the spawning ground of PBF recently. In 2021, over 1000 of PBF larvae were captured in the spawning grounds. Small juveniles of PBF around 2-5 cm FL were also captured in Nansei Island area and Joban area by small surface-trawl net. Particularly, 370 PBF juveniles were captured in Kuroshio Current around Nansei Island area. This is the first record of mass collection of small PBF juveniles.

Collected samples are being examined by a variety of approaches such as genetic identification, aging, growth analysis, stable isotope, microchemistry and stomach contents analyses to elucidate the survival processes of larval

and juvenile PBF in relation to biological and environmental factors, which should help to understand the recruitment mechanism to PBF fisheries around Japan.

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 the other tropical tunas. The research cruise was conducted from 25 October. 2021 to 15 November. 2021 around subtropical areas. This research cruise conducted CTD (XCTD) observations, mid-water trawl, 2-m ring plankton net and tucker trawl net tows and NORPAC. These sampling gears collected larvae and juveniles of skipjack and other tuna species as well as water to measure chlorophyll-a concentration.

6.4. 6.4. Biological sampling for swordfish, billfish and sharks

Regarding swordfish and billfish, character for aging (such as otolith and anal fin) and reproductive organ were collected from swordfish and striped marlins (including whole body of swordfish and striped marlin) in order to improve the accuracy of life history parameters (i.e., growth curve, maturity size and age etc.). Regarding sharks, muscle tissue, reproductive organ and stomach were collected from blue sharks and shortfin makos for the use of reproductive and ecological study of these two species. In addition to sampling for the life history study, blood or muscle tissue were collected from blue sharks, swordfish, striped marlin, and blue marlins, for the study of genetic population structure and other ecological study.

6.5. Bycatch species related research

Mitigation studies for seabirds

A research cruise was conducted from April to June 2022 using a longline fishing vessel of Den–Maru No. 37 (167 GRT), covering an area of 20º–35ºN and 137º–170ºE of the North Pacific Ocean. The objective of this research cruise was to investigate practical use of lure bait for bycatch mitigation, satellite tagging for loggerhead sea turtles and protocols of video image collection during longline operation.

References

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MAFFJ 2016–2020. Annual report of catch statistics on fishery and aquaculture 2016–2020, on the portal site for governmental statistics "e–Stat" (published in June 21, 2022). https://www.e–stat.go.jp/stat–search/files?page=1&toukei=00500216&tstat=000001015174

Table 1. Number of fishing vessels engaged in tuna fisheries in the WCPFC Convention Area by gear and size of vessel. Figures in last two years indicate provisional data. In the number of longline vessels, 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

	10–49 GRT	50–99 GRT	100–199 GRT	200– GRT	Total
2016	234	16	16	64	330
2017	233	15	16	59	323
2018	230	14	16	63	323
2019	230	13	17	51	311
2020	226	11	15	42	294
2021	197	10	16	47	270

Pole-and-line

	20–49 GRT	50–199 GRT	200– GRT	Total
2016	1	50	25	76
2017	1	48	31	80
2018	1	44	25	70
2019	1	42	24	67
2020	1	37	22	60
2021	1	35	22	58

Purse Seine

	50–199 GRT	200–499 GRT	500– GRT	Total
2016	38	33	4	75
2017	37	34	4	75
2018	35	30	4	69
2019	35	31	5	71
2020	34	31	6	71
2021	33	29	7	69

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 last two years indicate provisional data.

Distant water (120– GRT) and offshore (10–119 GRT) longlines

	#hooks	PBF	ALB	BET	YFT	SWO	MLS	BUM	BLM	SFA	SSP	SKJ
2016	46,927	18	5,272	4,684	5,487	3,724	270	847	44	134	66	45
2017	45,882	27	5,814	3,867	5,660	3,066	181	804	53	72	55	64
2018	47,143	21	4,441	4,565	5,408	3,429	149	719	57	75	47	36
2019	43,627	25	4,002	3,790	5,959	2,684	226	670	31	96	37	43
2020	37,453	75	3,701	3,247	2,909	3,997	232	384	23	33	26	42
2021	30,310	80	3,701	2,355	3,636	2,377	203	422	24	46	15	52

	BSH	LMD	POR	SMA	OCS	THR	FAL	SPN	RHN	O–shk	Total
2016	10,921	54	0	827	0	64	0	0	0	1	32,456
2017	10,140	128	0	640	0	61	0	0	0	1	30,635
2018	9,687	241	0	682	0	18	0	0	0	0	29,574
2019	8,655	151	0	670	0	35	0	0	0	0	27,072
2020	6,790	64	0	467	0	33	0	0	0	0	22,020
2021	7,282	86	0	301	0	21	0	0	0	0	20,600

Small offshore longline (10–19 GRT)

	#hooks	PBF	ALB	BET	YFT	SWO	MLS	BUM	BLM	SFA	SSP	SKJ
2016	69,360	–	–	6,783	4,679	2,005	577	964	19	28	1	4
2017	66,682	–	–	7,613	4,451	1,884	541	789	14	39	0	4
2018	65,322	–	–	7,461	4,743	1,732	471	769	14	47	0	3
2019	64,139	–	–	7,830	6,626	1,247	734	810	14	46	0	2
2020	66,144	–	–	6,423	3,975	1,386	779	629	19	57	1	3
2021	49,667	–	–	4,217	4,287	649	507	654	13	16	0	2

	BSH	LMD	POR	SMA	OCS	THR	FAL	SPN	RHN	O–shk	Total
2016	1,036	1,272	0	55	0	6	0	0	0	0	17,428
2017	1,571	3,092	0	66	0	47	0	0	0	1	20,111
2018	2,026	2,287	0	88	0	31	0	0	0	0	19,671
2019	1,697	2,225	0	72	0	11	0	0	0	0	21,313
2020	1,007	1,919	0	34	0	10	0	0	0	2	16,242
2021	1,363	480	0	39	0	20	0	0	0	1	12,246

* The catches for PBF and ALB are not appropriate to show here as the category "small offshore". See also Table 6 and 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 last two years indicate provisional data.

year	#days	#pole	SKJ	YFT	BET	PBF	ALB	Total
2016	14126	258159	61920.9	1666.5	948.9	–	14,402	78,938
2017	12913	236713	52254.8	1746.5	1240.5	–	20,861	76,103
2018	13445	249145	65740	1577.2	1275.8	–	17,756	86,349
2019	12663	233758	66959.6	1359.6	430.6	–	8,331	77,081
2020	11282	205705	39969.1	1278.9	938.1	–	36,384	78,570
2021	8733	152799	56980.2	1226.7	1232.8	–	36,384	95,824

* PBF catches for offshore and distant water pole-and-line were not estimated separately. See also Table 6 and 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. Figures in last two years indicate provisional data.

	#days	SKJ	YFT	BET	PBF*	ALB	Total
2016	6,355	126,400	38,073	2,116	–	–	166,589
2017	6,083	128,122	34,475	2,645	–	–	165,242
2018	5,231	132,838	40,673	3,626	–	–	177,137
2019	5,530	128,082	39,767	2,125	–	–	169,974
2020	5,947	119,047	33,640	2,404	–	–	155,091
2021	5,748	141,541	33,066	1,922	–	–	176,528

* PBF and ALB catches for tuna purse seine were not estimated separately. See also Table 6 and Appendix Table 2 to see statistics for PBF and ALB catches.

Table 5. Japanese catches (mt) for miscellaneous coastal fisheries by species and gear in the WCPFC Convention Area. 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 last two years are provisional.

Coastal longline

	SKJ	YFT	BET	PBF*	ALB*	SWO	MLS	BUM+BLM	Total
2016	4	2,018	280	–	–	89	201	147	2,739
2017	6	1,666	291	–	–	91	223	116	2,393
2018	6	1,611	298	–	–	69	240	113	2,337
2019	3	1,987	298	–	–	54	222	114	2,678
2020	2	1,616	231	–	–	63	178	91	2,181
2021	2	1,616	231	–	–	63	178	91	2,181

Coastal pole-and-line

	SKJ	YFT	BET	PBF*	ALB	Total
2016	8,438	1,554	63	–	33	10,088
2017	10,441	1,456	203	–	30	12,130
2018	13,418	1,942	156	–	119	15,635
2019	9,343	1,583	118	–	177	11,221
2020	10,356	1,798	178	–	254	12,586
2021	10,356	1,798	178	–	254	12,586

Coastal purse seine

	SKJ	YFT	BET	PBF*	ALB	Total
2016	62	342	2	–	3	409
2017	467	376	1	–	17	861
2018	57	144	0	–	2	203
2019	102	482	0	–	274	858
2020	146	1,014	0	–	10	1,170
2021	146	1,014	0	–	10	1,170

Gillnet

	SKJ	YFT	BET	PBF*	ALB	Total
2016	111	16	0	–	19	4,127
2017	61	7	1	–	40	3,718
2018	91	6	1	–	35	3,050
2019	96	4	1	–	9	4,110
2020	70	13	0	–	7	3,810
2021	70	13	0	–	7	3,810

Troll

	SKJ	YFT	BET	PBF	ALB	Total
2016	1,642	2,250	87		148	4,127
2017	1,615	1,877	119		107	3,718
2018	1,154	1,738	80		78	3,050
2019	1,387	2,070	110		543	4,110
2020	949	2,008	69		784	3,810
2021	949	2,008	69		784	3,810

Setnet

	SKJ	YFT	BET	PBF	ALB	Total
2016	264	120	1		28	413
2017	401	135	0		48	584
2018	494	77	0		13	584
2019	246	208	0		27	481
2020	335	125	1		25	486
2021	335	125	1		25	486

* PBF catches for coastal longline, coastal pole-and-line, coastal purse seine and gillnet were not estimated separately. See also Table 6 and 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 five tuna species by gear in the WCPFC Convention Area. LL: longline, PL: pole-and-line, PS: purse seine. Figures in last two years are provisional.

	2016	2017	2018	2019	2020	2021
Skipjack; Sub–total	198,943	193,517	213,969	206,372	171,005	210,519
Distant water and Offshore LL	45	64	36	43	42	52
Distant water and Offshore PL	61,921	52,255	65,740	66,960	39,969	56,980
Tuna PS	126,400	128,122	132,838	128,082	119,047	141,541
Small offshore LL	4	4	3	2	3	2
Coastal LL	4	6	6	3	2	2
Coastal PL	8,438	10,441	13,418	9,343	10,356	10,356
Coastal PS	62	467	57	102	146	146
Gill net	111	61	91	96	70	70
Troll	1,642	1,615	1,154	1,387	949	949
Set net	264	401	494	246	335	335
Unclassified	53	81	133	110	86	86
Yellowfin; Sub–total	57,012	52,540	58,506	60,823	49,222	49,635
Distant water and Offshore LL	5,487	5,660	5,408	5,959	2,909	3,636
Distant water and Offshore PL	1,667	1,747	1,577	1,360	1,279	1,227
Tuna PS	38,073	34,475	40,673	39,767	33,640	33,066
Small offshore LL	4,679	4,451	4,743	6,626	3,975	4,287
Coastal LL	2,018	1,666	1,611	1,987	1,616	1,616
Coastal PL	1,554	1,456	1,942	1,583	1,798	1,798
Coastal PS	342	376	144	482	1,014	1,014
Gill net	16	7	6	4	13	13
Troll	2,250	1,877	1,738	2,070	2,008	2,008
Set net	120	135	77	208	125	125
Unclassified	806	690	587	778	846	846
Bigeye; Sub–total	15,074	16,069	17,546	14,816	13,625	10,340
Distant water and Offshore LL	4,684	3,867	4,565	3,790	3,247	2,355
Distant water and Offshore PL	949	1,241	1,276	431	938	1,233
Tuna PS	2,116	2,645	3,626	2,125	2,404	1,922
Small offshore LL	6,783	7,613	7,461	7,830	6,423	4,217
Coastal LL	280	291	298	298	231	231
Coastal PL	63	203	156	118	178	178
Coastal PS	2	1	0	0	0	0
Gill net	0	1	1	1	0	0
Troll	87	119	80	110	69	69
Set net	1	0	0	0	1	1
Unclassified	109	89	84	113	135	135
Pacific bluefin; Sub–total	8,359	9,000	6,205	7,509	8,011	8,529
Coastal LL (less than 20 GRT)	677	892	679	977	1,341	1,356
Offshore and distant water LL	187	27	21	25	75	80
PL (unspecified)	54	49	9	0	1	0
PS (unspecified)	5,095	4,540	4,049	4,464	3,960	4,198
Troll	778	605	371	720	760	653
Setnet	1,228	2,221	645	951	1,342	1,742
Unclassified	508	665	431	372	532	500
Albacore; Sub–total	36,833	41,870	35,711	21,640	57,523	57,523
Coastal LL (less than 20 GRT)	13,118	13,597	10,121	7,386	10,242	10,242
Offshore and distant water LL	5,272	5,814	4,441	4,002	3,701	3,701
Coastal PL	33	30	119	177	254	254
Distant water and Offshore PL	14,409	20,863	17,795	8,356	36,390	36,390
PS (unspecified)	3,679	1,251	3,039	1,045	5,961	5,961
Gillnet	19	40	35	9	7	7
Troll	148	107	78	543	784	784
Set net	28	48	13	27	25	25
Unclassified	128	119	70	95	159	159
Total	316,221	312,995	331,938	311,160	299,386	336,547

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

Type of fishery	2016	2017	2018	2019	2020	2021
Distant water longline	100%	100%	100%	100%	100%	85%
Offshore longline	96%	96%	97%	92%	93%	62%
Small offshore longline	93%	88%	87%	88%	86%	50%
Coastal longline	N/A	N/A	N/A	N/A	N/A	N/A
Offshore pole-and-line (20–120 GRT)	100%	100%	100%	100%	100%	100%
Distant water pole-and-line (over 120 GRT)	100%	100%	100%	100%	100%	100%
Purse seine (>200GRT)	100%	100%	100%	100%	100%	100%

Table 8. Number of operations and catch number for longline observer program in the western central Pacific in 2021.

Fishery	Small offshore longline
Number of Cruises	1
Number of Operation	20
Number of Catch Observed	1,380
Catch by species	
Albacore	1,018
Yellowfin tuna	70
Bigeye tuna	12
Skipjack tuna	43
Sailfish	1
Blue marlin	26
Shortbill spearfish	19
Swordfish	4
Lancetfishes	45
Pomfrets	5
Dolphinfishes	4
Escolar	22
Other fish	79
Thresher sharks	1
Blue shark	18
Other sharks	4
Stingray	8
Mammals	1

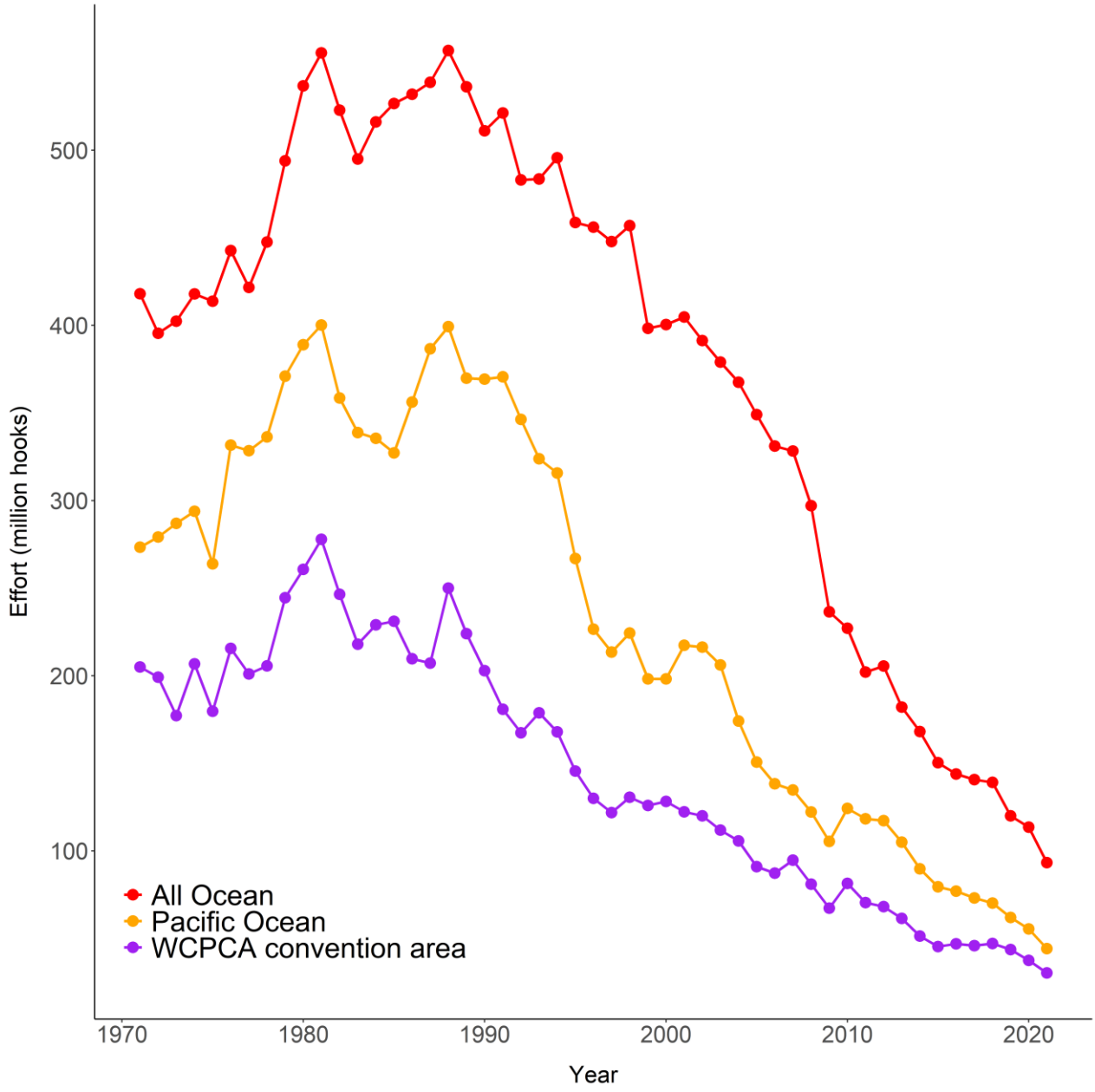

Fig. 1. Time series of fishing effort of the Japanese distant water and offshore longline fishery (not including small offshore) in the WCPFC Convention Area. Values in 2020 and 2021 are provisional.

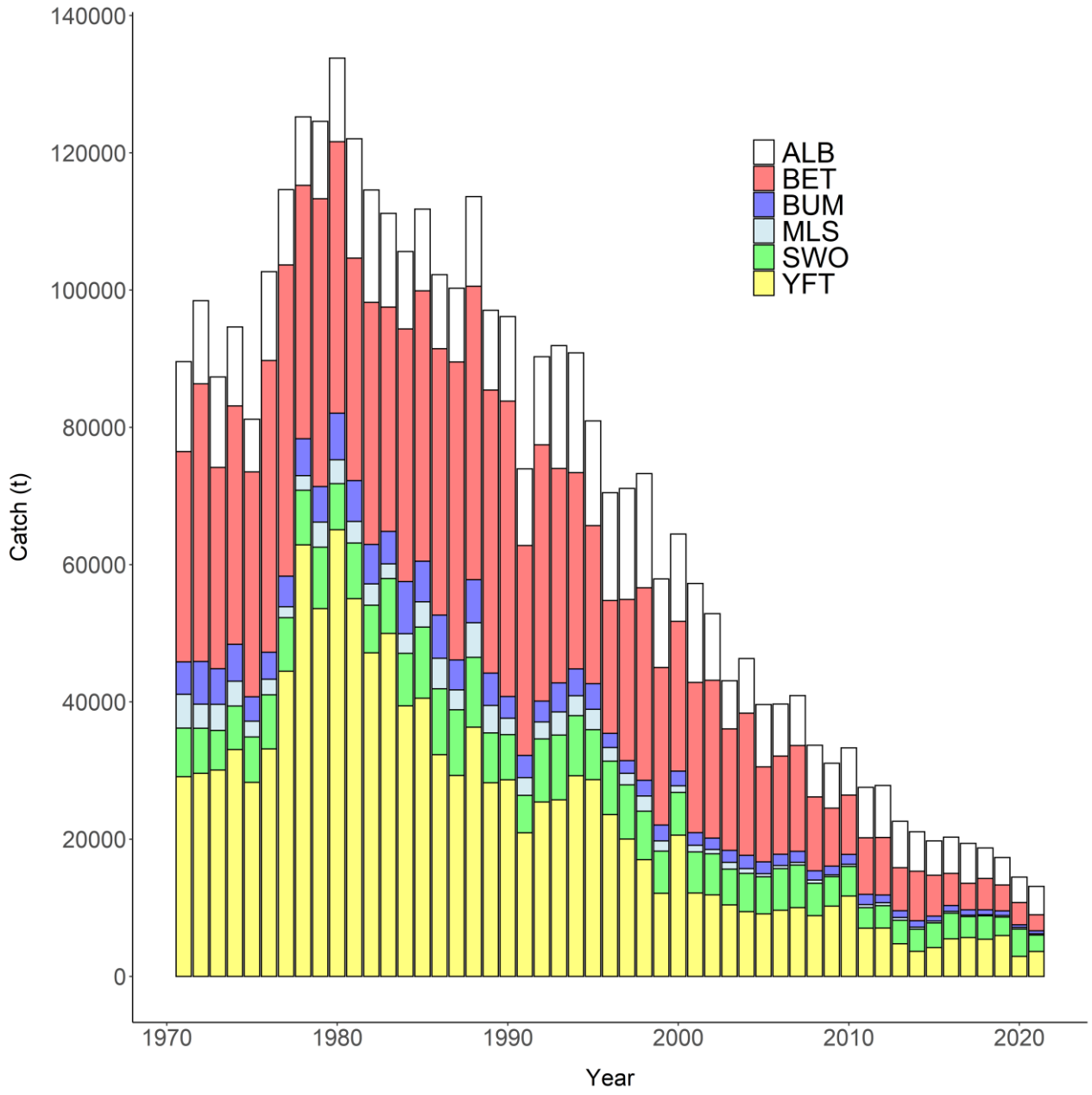

Fig. 2. Time series of catches for major species for the Japanese distant water and offshore longline fishery (not including small offshore) in the WCPFC Convention Area. ALB: albacore, BET: bigeye, YFT: yellowfin, SWO: sword fish, MLS: striped marlin, BUM: blue marlin. Values in 2020 and 2021 are provisional.

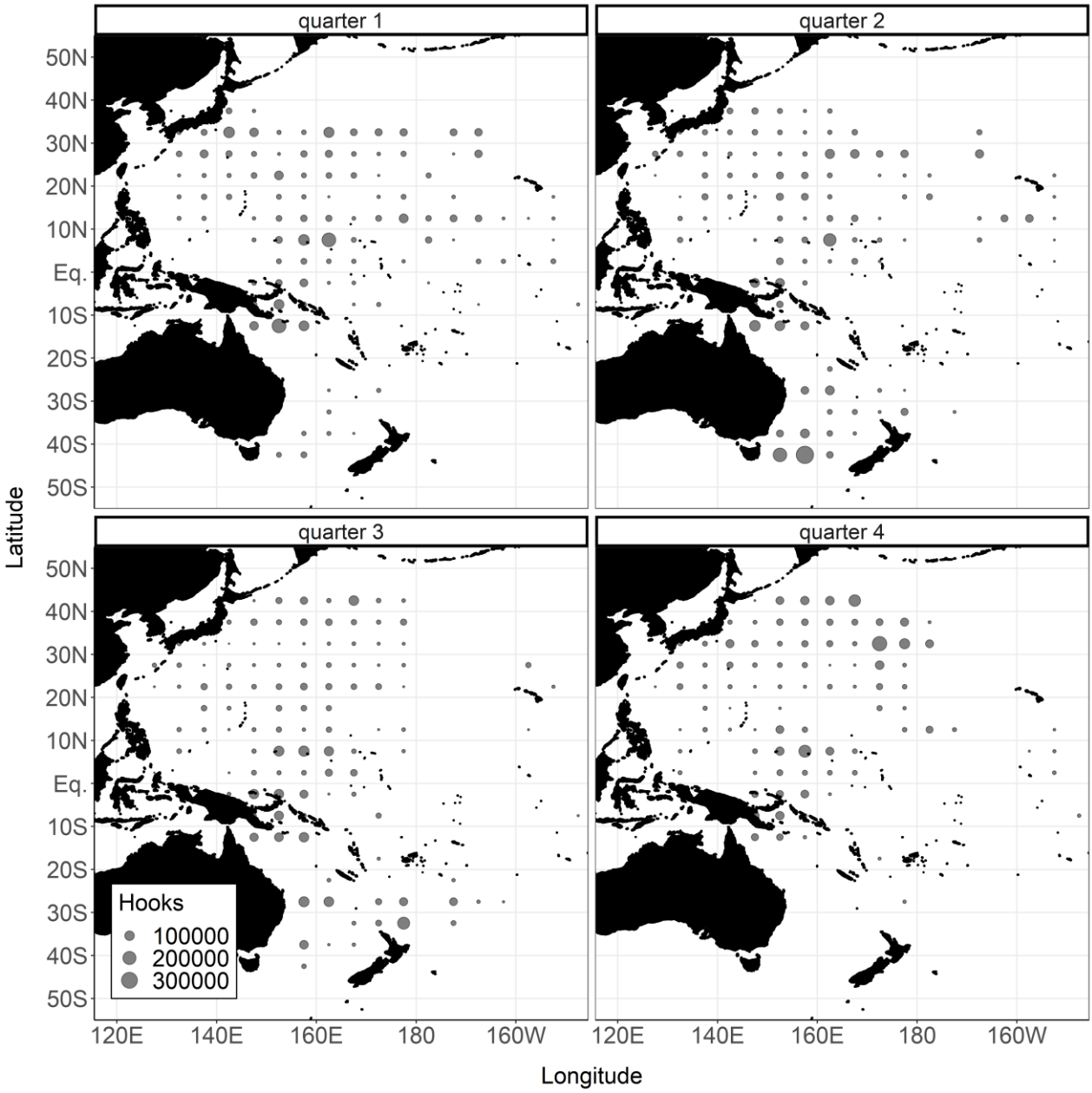

Fig. 3. Quarterly distribution of fishing effort for the Japanese offshore and distant water longline fisheries in the western and central Pacific Ocean in average of 2019‐2021.

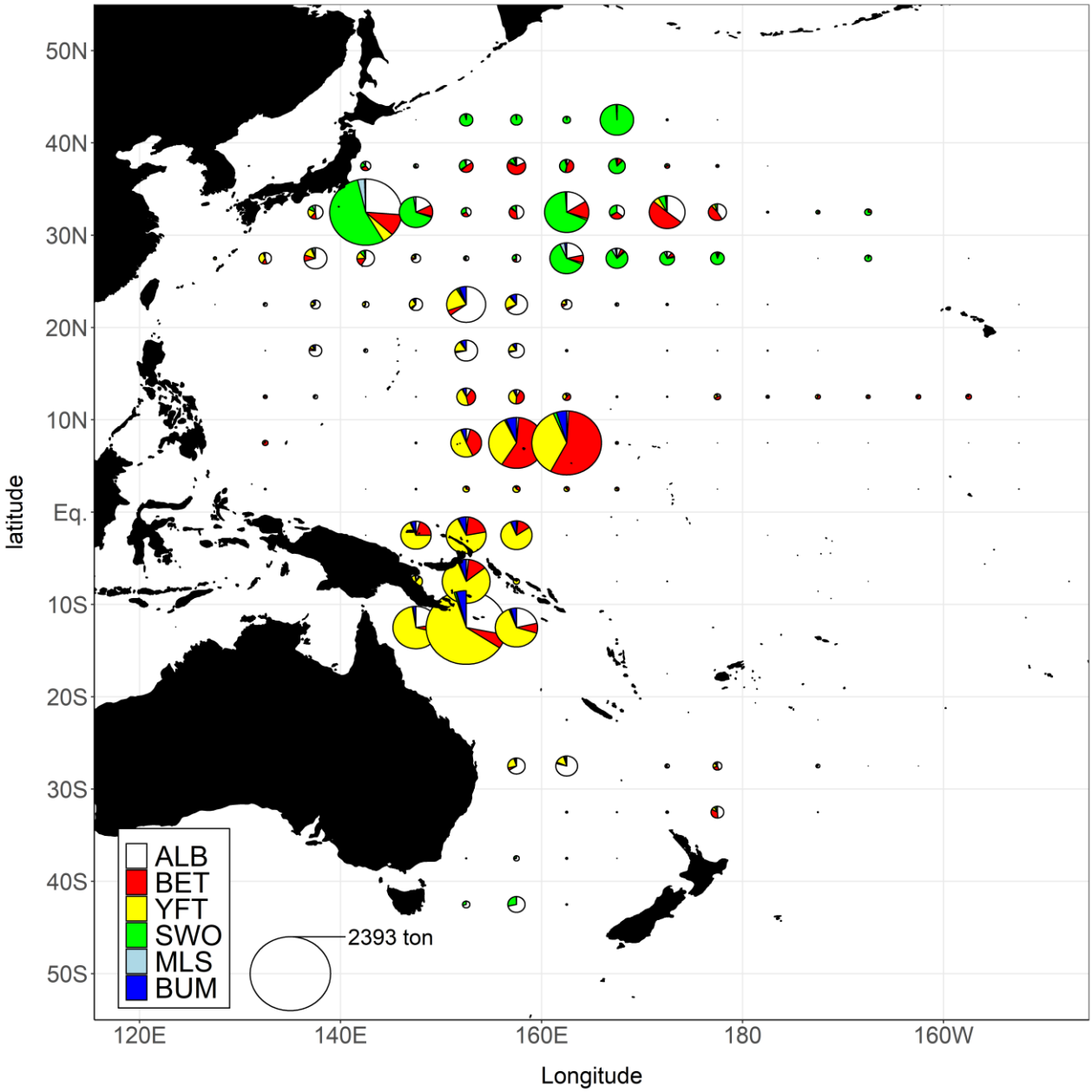

Fig. 4. Distributions of offshore and distant water longline catch (in weight) by species in average of 2019–2021 for six species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BUM: blue marlin).

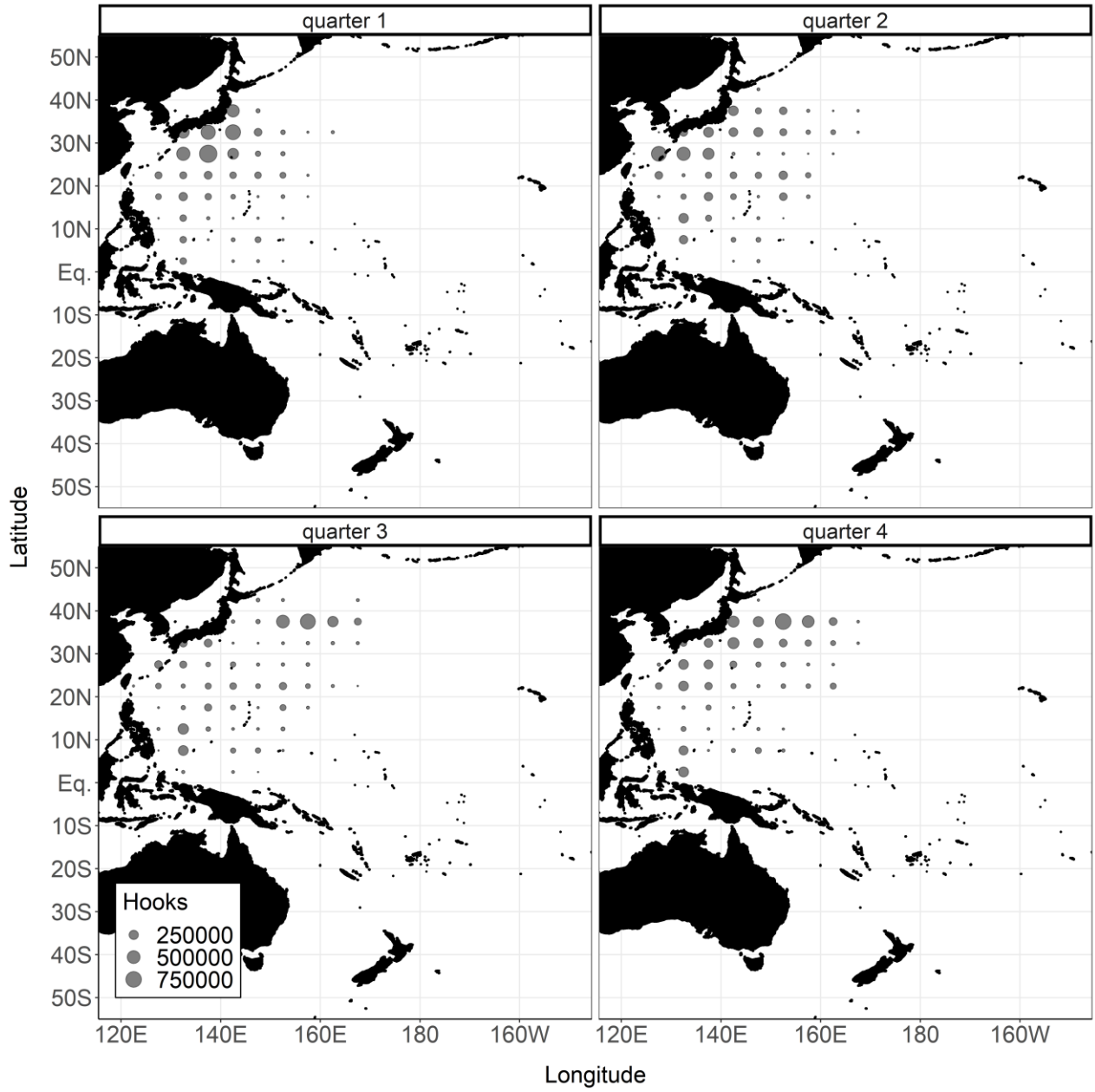

Fig. 5. Quarterly distribution of fishing effort for the Japanese small offshore longline fishery (10–19 GRT) in the western and central Pacific Ocean in average of 2019–2021.

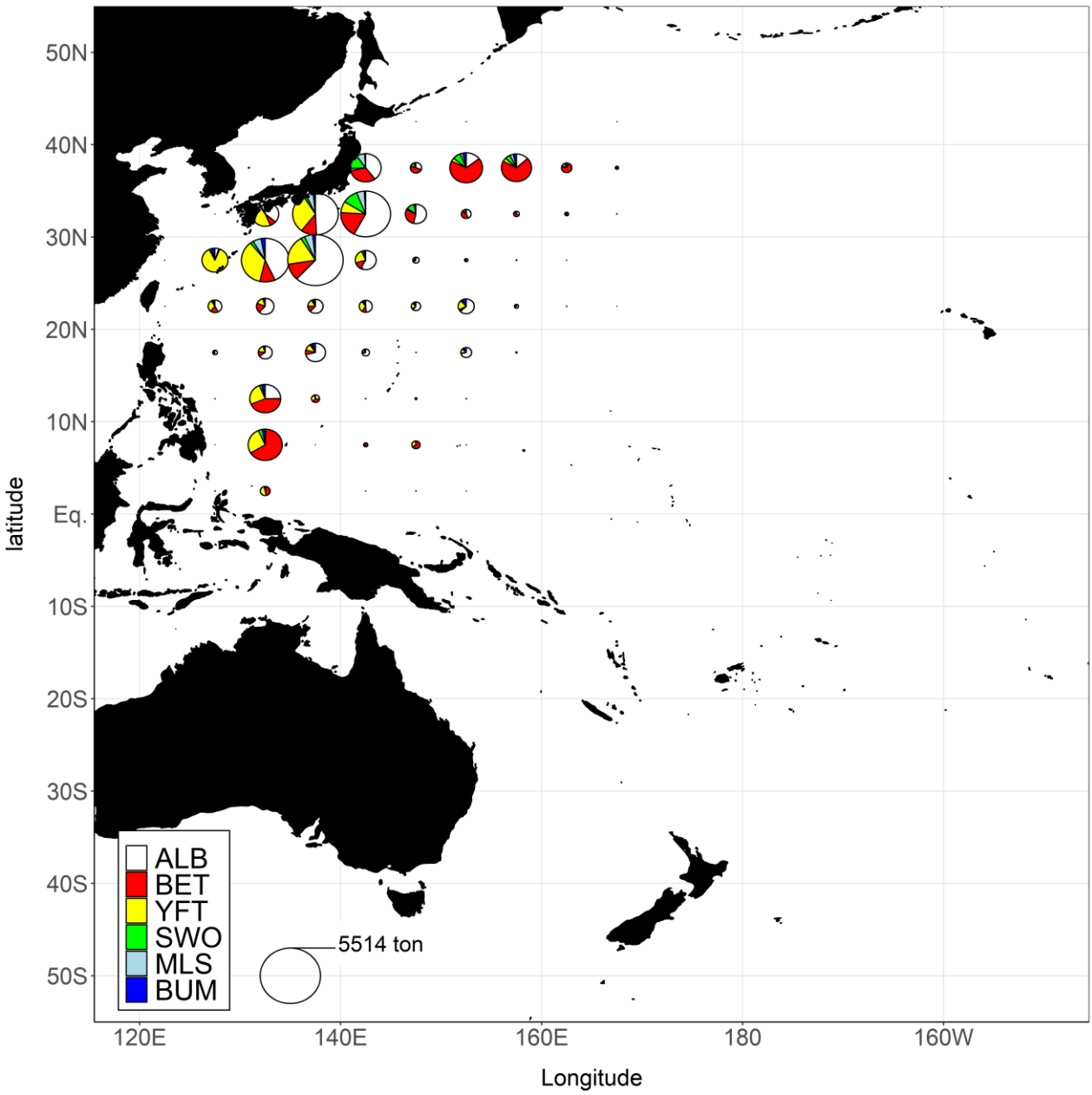

Fig. 6. Distributions of small offshore longline catch (in weight) by species in average of 2019–2021 for six species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BUM: blue marlin).

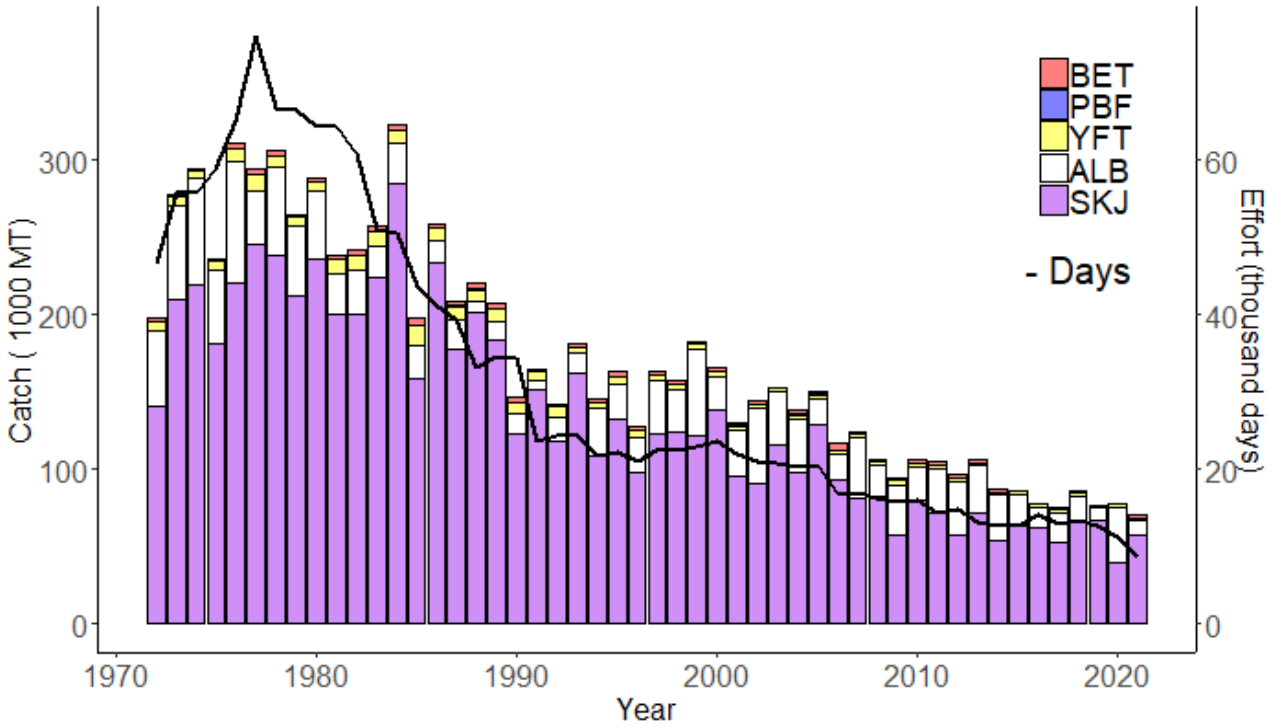

Fig. 7. Time series of fishing effort and catches by species for the Japanese pole-and-line fishery (> 20GRT) in the WCPFC Convention Area. Values in 2020 and 2021 are provisional.

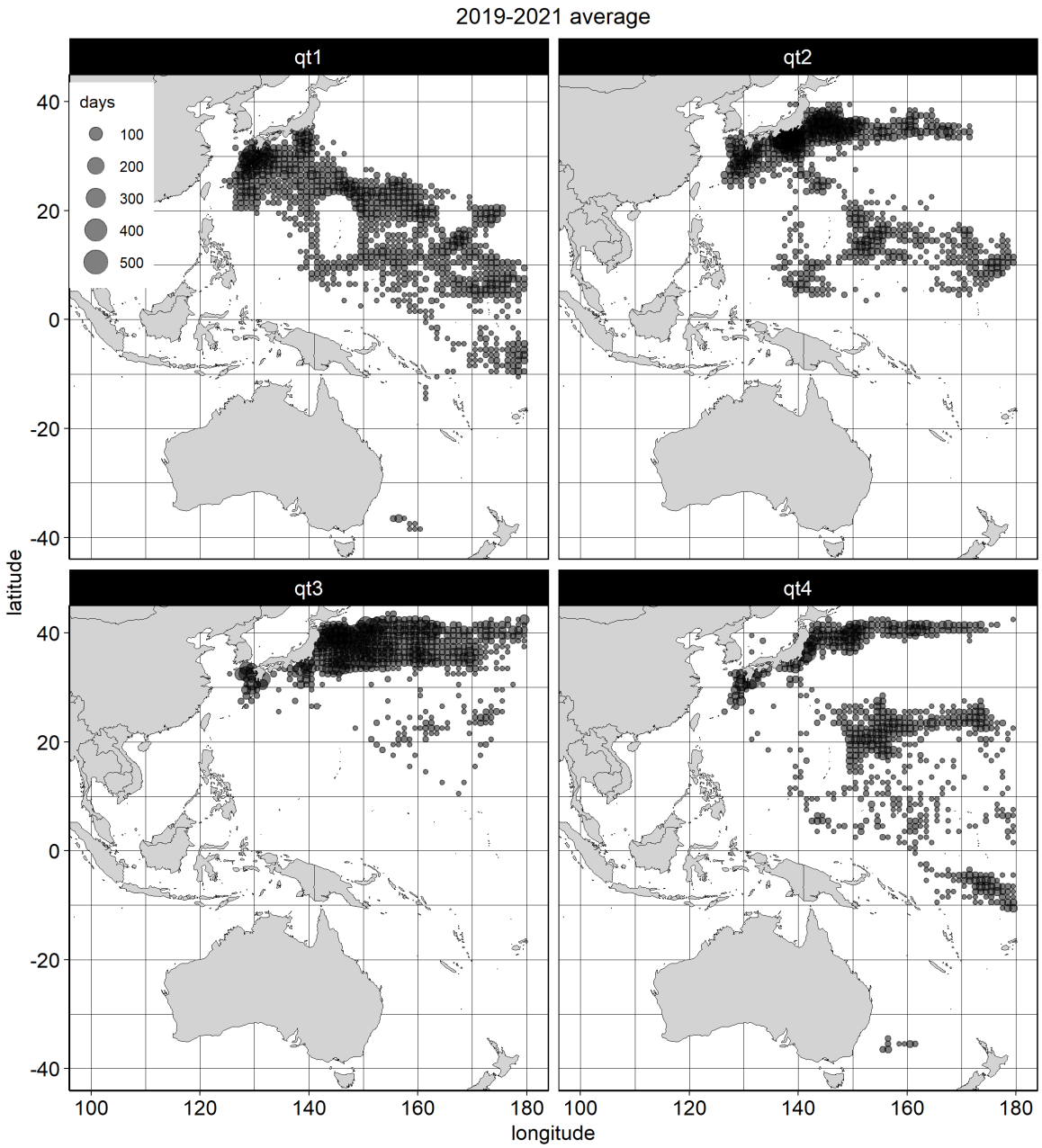

Fig. 8. Quarterly distribution of fishing effort (days) for the Japanese pole-and-line fishery (offshore and distant water licenses) in the Pacific Ocean in average of 2019–2021.

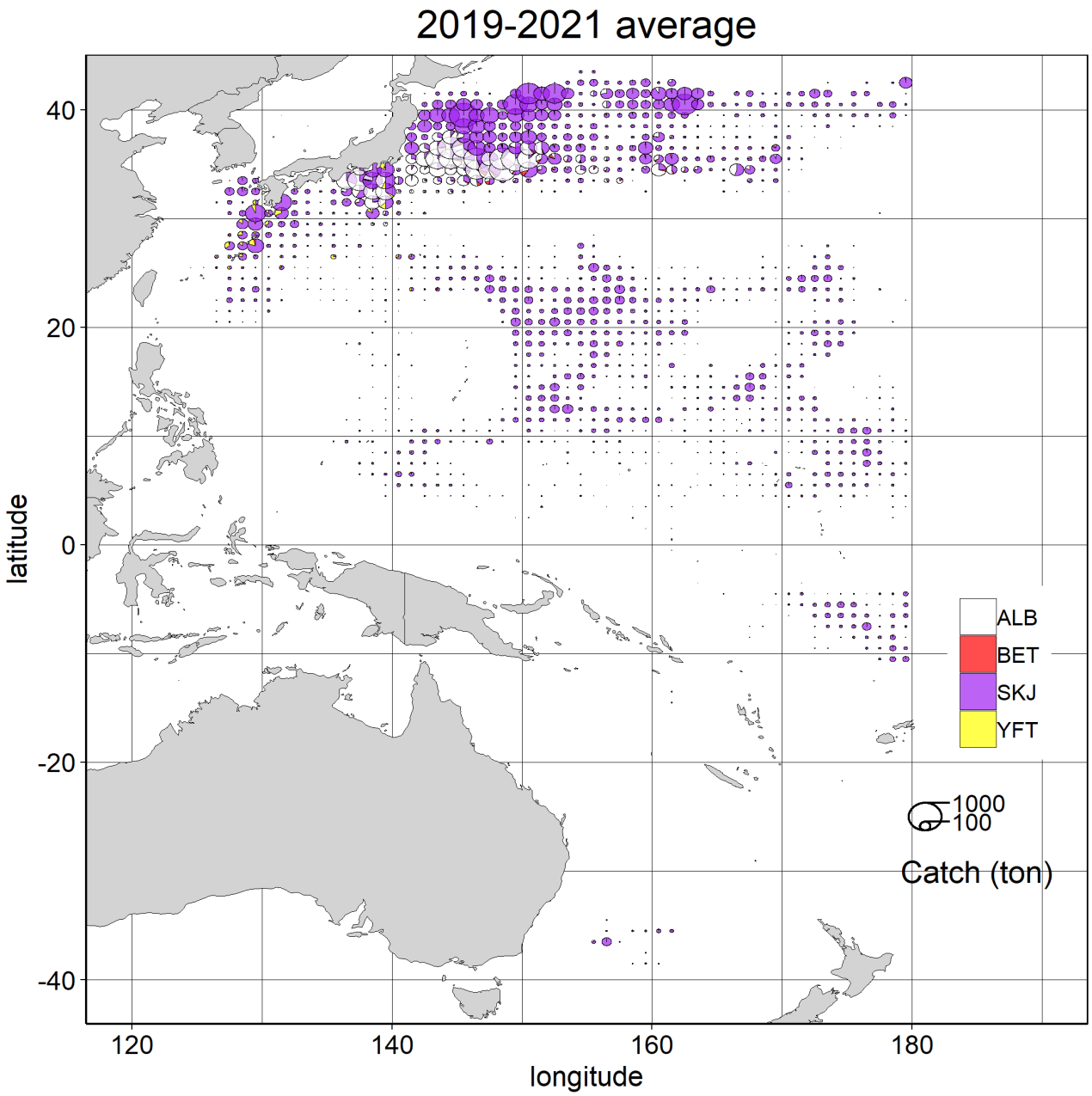

Fig. 9. Distribution of catch and its species composition for the Japanese offshore and distant water pole-and-line fishery in average of 2019–2021.

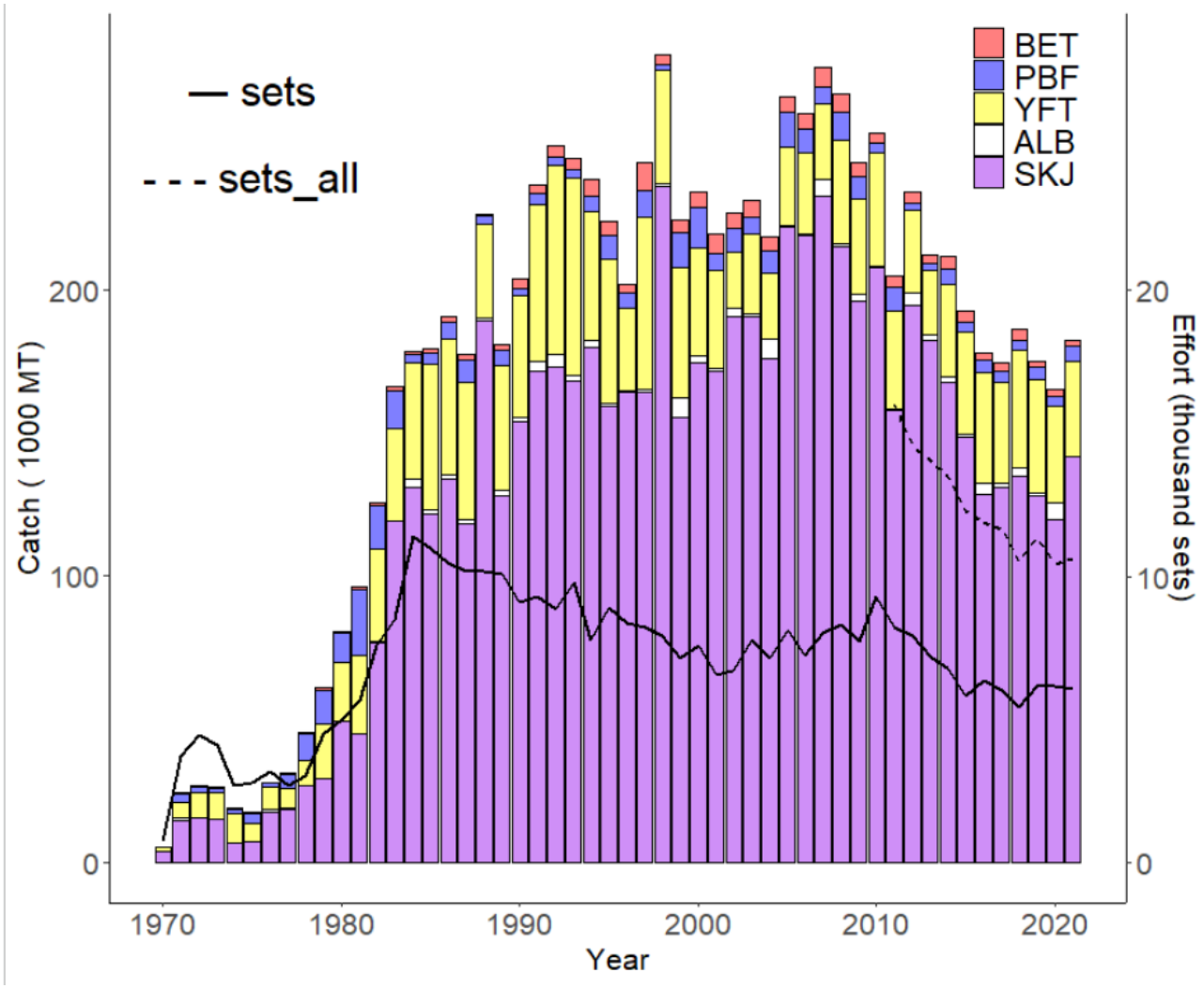

Fig. 10. Time series of fishing effort and catches by species for the Japanese tuna purse seine fishery in the WCPFC Convention Area. Solid and dashed line indicates number of sets including operations in the Sea of Japan and the East China Sea, and excluding them, respectively. Values in and 2020 and 2021 are provisional.

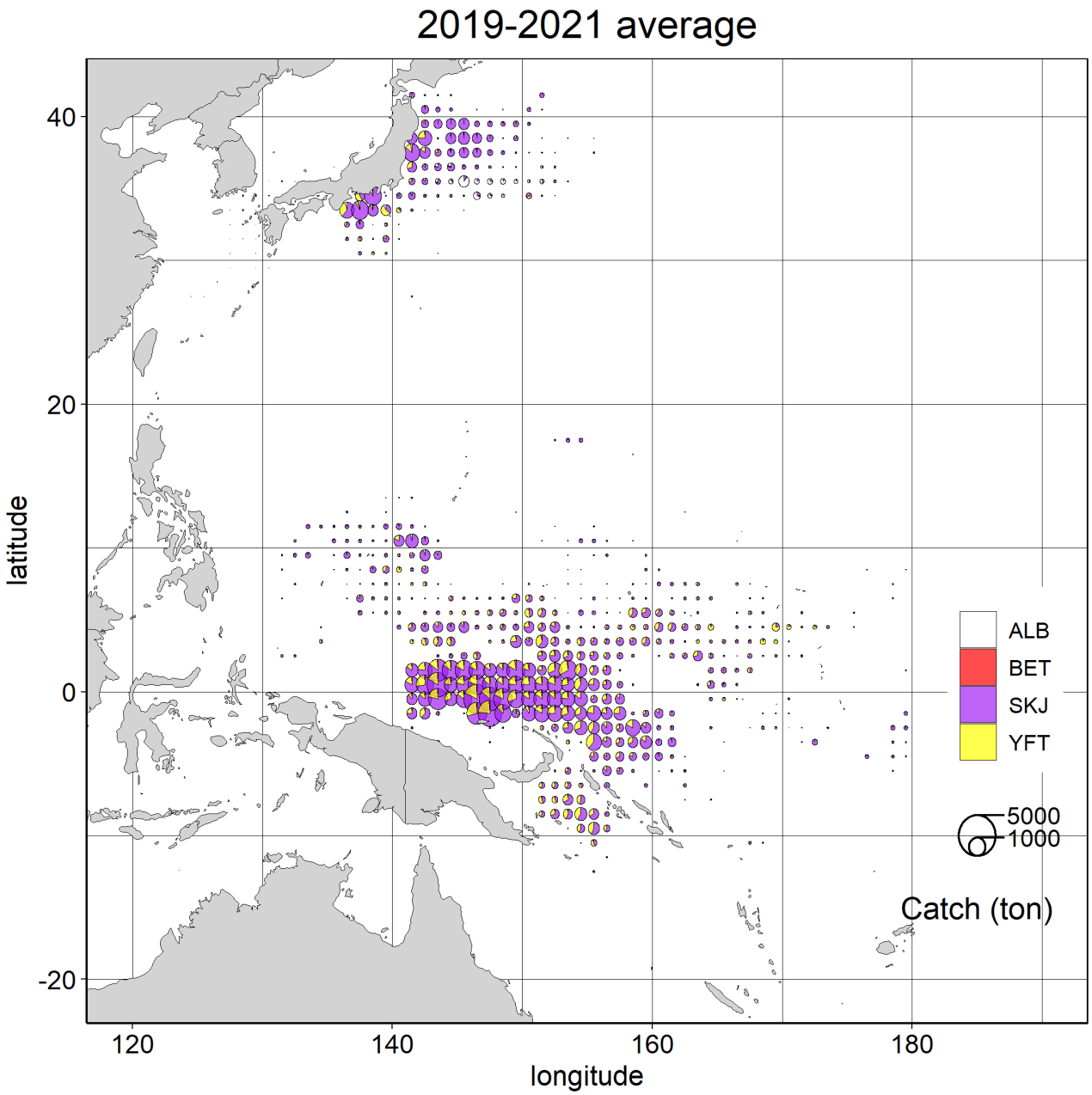

Fig. 11. Distribution of tuna purse seine catch (t) by species (skipjack, yellowfin and bigeye) combined for 2019–2021.

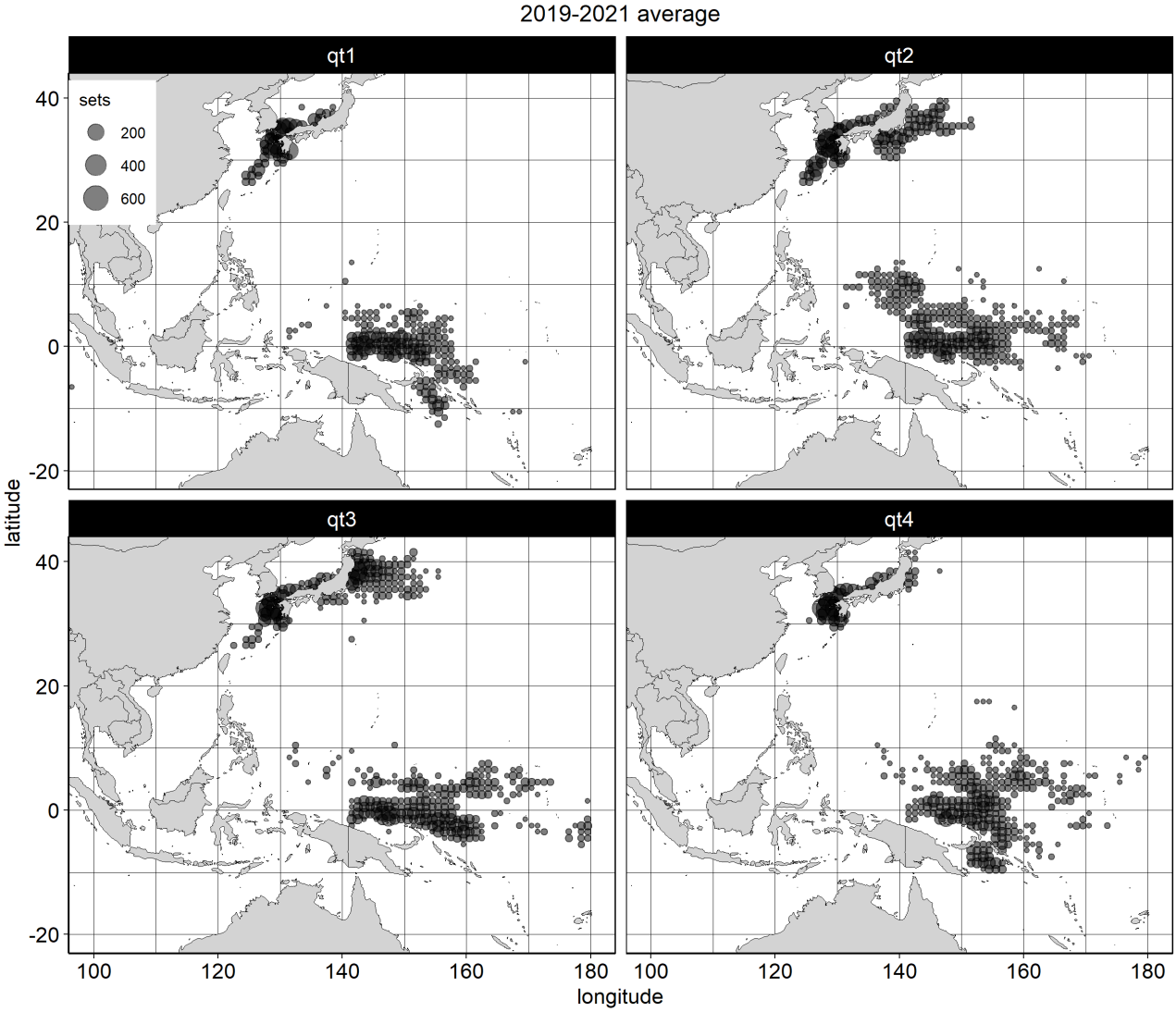

Fig. 12. Quarterly distributions of fishing effort (number of set) for the Japanese tuna purse seine fishery in the Pacific Ocean for 2019–2021.

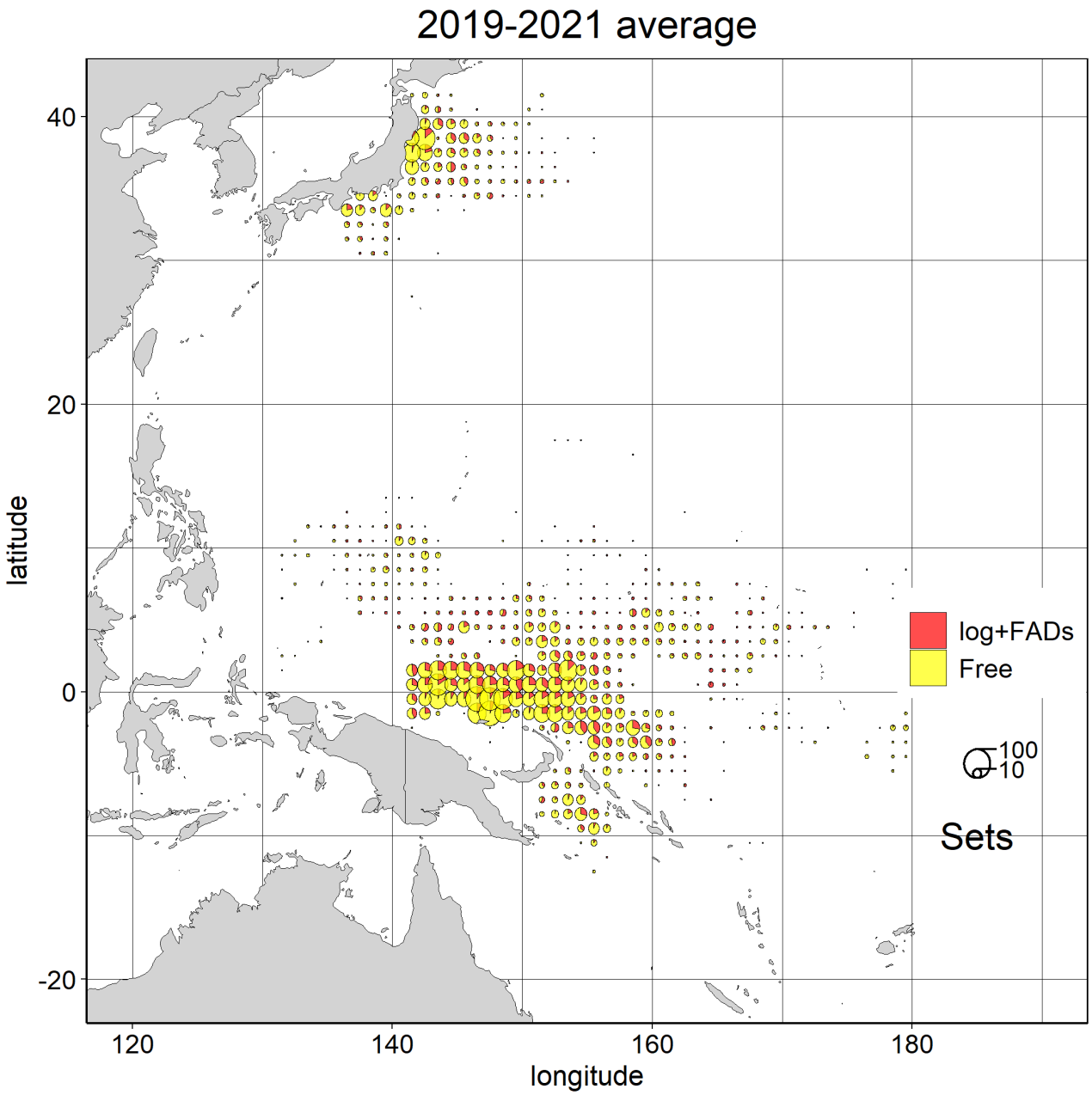

Fig. 13. Distribution of sets by type of school for 2019–2021 deployed by the tuna purse seine fishery by Japan.

Appendix Table 3. 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.

	Japan–flagged vessels south of 20S		Chartered vessels		Other vessels fishing within the Japan's waters south of 20S		
Year	Catch (mt)	Vessel numbers	Catch (mt)	Vessel numbers	Flag	Catch (mt)	Vessel numbers
2016	239	26	0	0	—	—	—
2017	172	26	0	0	—	—	—
2018	175	27	0	0	—	—	—
2019	101	27	0	0	—	—	—
2020	111	21	0	0	—	—	—
2021	144	23	0	0	—	—	—

Appendix Table 4. Observer coverage for the Japanese longline fishery. Values in 2020 and 2021 are provisional. This table was request written in WCPFC 11 decision – para 484(b).

		No. of Hooks			Days Fished			Days at Sea			No. of Trips		
Year	Fishery	T.	O.	%	Total	Observer	%	T.	O.	%	T.	O.	%
2016	Ice/Fresh, short–trip	***	***	***	26256	874	3.33%	***	***	***	***	***	***
	Frozen, long–trip	***	***	***	8392	690	8.22%	***	***	***	***	***	***
2017	Ice/Fresh, short–trip	***	***	***	24166	919	3.80%	***	***	***	***	***	***
	Frozen, long–trip	***	***	***	8110	586	7.23%	***	***	***	***	***	***
2018	Ice/Fresh, short–trip	***	***	***	24688	938	3.80%	***	***	***	***	***	***
	Frozen, long–trip	***	***	***	8508	614	7.22%	***	***	***	***	***	***
2019	Ice/Fresh, short–trip	***	***	***	24945	1473	5.90%	***	***	***	***	***	***
	Frozen, long–trip	***	***	***	7394	888	12.01%	***	***	***	***	***	***
2020	Ice/Fresh, short–trip	***	***	***	21814	51	0.23%	***	***	***	***	***	***
	Frozen, long–trip	***	***	***	5407	232	4.29%	***	***	***	***	***	***
2021	Ice/Fresh, short–trip	***	***	***	20006	20	0.09%	***	***	***	***	***	***
	Frozen, long–trip	***	***	***	5578	0	0%	***	***	***	***	***	***

Appendix Table 5-1. The total quantity (mt) of highly migratory fish stocks transshipped by fishing vessels. That was request written in **paragraph 11 of CMM-2009-06**.

(1) The total quantities in 2021, by weight, of highly migratory fish stocks covered by this measure that were transhipped by fishing vessels the CCM is responsible for reporting against, with those quantities broken down by:

a) offloaded and received;	b) transhipped in port, transhipped at sea in areas of national jurisdiction, and transhipped beyond areas of national jurisdiction	c) transhipped inside the Convention Area and transshipped outside the Convention Area;	d) caught inside the Convention Area and caught outside the Convention Area;	e) Species	f) Product Form	g) Fishing gear	Quantity (mt)
Offloaded							439.4
	At sea beyond NJ						439.4
		Inside CA					233.3
			Inside CA				24.7
				BET			10.3
					GG	Longline	10.3
				YFT			5.1
					GG	Longline	5.1
				SWO			1.5
					DR	Longline	1.5
				Others			7.8
					GG	Longline	2.3
					DR	Longline	0.2
					Whole	Longline	5.3
			Outside CA				208.6
				BET			110.9
					GG	Longline	110.9
				YFT			25.6
					GG	Longline	25.6
				SWO			12.3
					DR	Longline	4.6
					FL	Longline	7.7
				Others			59.8
					Others		59.8
		Outside CA					206.2
			Inside CA				206.2
				BET			34.6
					GG	Longline	34.6
				YFT			152.4
					GG	Longline	152.4
				SWO			1.2
					FL	Longline	1.2
					DR	Longline	0.03
				Others			17.9
					GG	Longline	1.0
					DR	Longline	2.4
					Whole	Longline	14.4
Received							2835.82~~2700~~
	At sea beyond NJ						135.8
		Outside CA					135.8
			Inside CA				135.8
				BET			24.5
					GG	Longline	24.5
				YFT			111.3
					GG	Longline	111.3
	In port						2700
		Inside CA					2700
			Inside CA				2700
				BET			11

a) offloaded and received;	b) transhipped in port, transhipped at sea in areas of national jurisdiction, and transhipped beyond areas of national jurisdiction	c) transhipped inside the Convention Area and transshipped outside the Convention Area;	d) caught inside the Convention Area and caught outside the Convention Area;	e) Species	f) Product Form	g) Fishing gear	Quantity (mt)
					Whole		11
				YFT			22
					Whole		22
				SKJ			2667
					Whole		2667

Appendix Table 5-2. The number of transshipments involving highly migratory fish stocks. That was request written in **paragraph 11 of CMM-2009-06**.

(2) The number of transhipments in 2021 involving highly migratory fish stocks covered by this measure by fishing vessels that is responsible for reporting against, broken down by:

a) offloaded and received	b) transhipped in port, transhipped at sea in areas of national jurisdiction, and transhipped beyond areas of national jurisdiction	c) transhipped inside the Convention Area and transhipped outside the Convention Area	d) caught inside the Convention Area and caught outside the Convention Area	e) fishing gear	number of transhipments
Offloaded					7
	At sea beyond NJ				7
		Inside CA			3
			Inside CA	Longline	1
			Outside CA	Longline	2
		Outside CA			4
			Inside CA	Longline	3
			Inside CA & Outside CA	Longline	1
Received					54
	At sea beyond NJ				1
		Outside CA			1
			Inside CA	Longline	1
	In port				4
		Inside CA			4
			Inside CA	Longline	4

Appendix Table 6-1. Effort, observed and estimated seabird captures by the longliners larger than 20 GRT (approximately >= 24m) by years for Japan [South of 30˚S, 23˚N – 30˚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). This table was request written in **paragraph 9 of CMM-2017-06**.

North of 23˚N

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2017	39	11,644,673	194,758	1.7%	63	0.323
2018	36	11,842,387	328,315	2.8%	61	0.186

23˚N – 30˚S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2017	75	22,023,754	803,403	3.6%	2	0.002
2018	78	22,283,031	900,841	4.0%	0	0.000

South of 30˚S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2017	26	6,559,955	516,347	7.9%	27	0.052
2018	27	7,003,023	170,738	2.4%	37	0.217

Appendix Table 6-2. Effort, observed and estimated seabird captures by the longliners less than 20 GRT (approximately < 24m) by years for Japan [South of 30˚S, 23˚N – 30˚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). This table was request written in **paragraph 9 of CMM-2017-06**.

North of 23˚N

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2017	208	53,257,572	771,342	1.4%	215	0.279
2018	209	50,681,381	860,447	1.7%	55	0.064

23˚N – 30˚S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2017	138	19,078,101	708,005	3.7%	2	0.003
2018	154	20,655,114	630,881	3.1%	7	0.011

Appendix Table 6-3. Effort, observed and estimated seabird captures by the longliners larger than 20 GRT (approximately >= 24m) by fishing year for Japan [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). This table was request written in **paragraph 13 of CMM-2018-03**.

North of 23˚N

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2019	36	11,281,780	379,310	3.4%	83	0.219
2020	42	14,277,669	0	0.0%	0	0.000
2021	35	10,139,330	0	0.0%	0	0.000

23˚N – 25˚S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2019	65	20,028,937	798,284	4.0%	4	0.005
2020	49	11,381,824	0	0.0%	0	0.000
2021	48	9,866,422	38,073	0.4%	0	0.000

25˚S – 30˚S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2019	9	844,467	165,091	19.5%	0	0.000
2020	14	1,562,742	132,871	8.5%	0	0.000
2021	12	937,647	0	0.0%	0	0.000

South of 30˚S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2019	27	5,388,415	962,377	17.9%	1,140	1.185
2020	21	3,704,810	205,451	5.5%	13	0.063
2021	23	4,036,450	0	0.0%	0	0.000

Appendix Table 6-4. Effort, observed and estimated seabird captures by the longliners less than 20 GRT (approximately < 24m) by fishing year for Japan [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). This table was request written in **paragraph 13 of CMM‑2018‑03**.

North of 23˚N

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2019	208	49,643,819	1,570,492	3.2%	437	0.278
2020	214	56,627,596	39,835	0.1%	28	0.703
2021	176	39,700,308	0	0.0%	0	0.000

23˚N – 25˚S

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2019	148	20,578,515	792,447	3.9%	1	0.001
2020	130	16,042,660	51,456	0.3%	2	0.039
2021	106	15,296,506	0	0.0%	0	0.000

Appendix Table 7-1. Proportion of observed effort by seabird bycatch mitigation types[1] used by longliners in 2017–2018. This table was request written in **paragraph 9 of CMM-2017-06**.

Combination of mitigation measures	Proportion of observed effort using mitigation measures	
	2017	2018
No mitigation measure	0.0%	0.0%
TL + NS	0.0%	0.0%
WTL + NS	0.0%	0.0%
TL + NS + MOD	3.3%	1.1%
WTL + NS + MOD	0.3%	2.6%
TL + WB + MOD	6.5%	0.0%
WTL + WB + MOD	3.1%	0.0%
TL + WB + NS + MOD	3.6%	0.0%
WTL + WB + NS + MOD	2.8%	0.0%
NS	0.0%	0.0%
TL	0.0%	0.0%
WTL	0.0%	0.1%
TL + MOD	25.4%	19.4%
WTL + MOD	1.2%	12.5%
NS + MOD	0.8%	2.6%
WB + MOD	7.4%	0.0%
MOD	45.6%	61.7%
Total	0.0%	0.0%

Appendix Table 7-2. Proportion of mitigation types[1] used by the fleet in 2019–2021. This table was request written in **paragraph 13 of CMM-2018-03**.

2019	Combination of mitigation measures	Proportion of observed effort using mitigation measures		
		South of 30^0S	25^0S to 23^0N	North of 23^0N
Options required south of 30^0S	TL + NS + MOD	23.8%	0.0%	3.8%
	TL + WB + MOD	11.4%	0.0%	0.0%
	WB + NS + MOD	1.0%	0.7%	0.0%
	TL + WB + NS + MOD	5.8%	0.0%	0.0%
Other options 25^0S – 30^0S	TL + MOD	50.6%	0.2%	70.3%
	WB + MOD	1.7%	3.6%	0.0%
Other options north of 23^0N	NS + MOD	2.1%	1.9%	0.7%
	MOD	3.5%	93.6%	25.2%
Total		100.0%	100.0%	100.0%

2020	Combination of mitigation measures	Proportion of observed effort using mitigation measures			
		South of 30^0S	25^0S – 30^0S	25^0S to 23^0N	North of 23^0N
Options required south of 30^0S	TL + NS + MOD	0.0%	0.0%	0.0%	0.2%
	TL + WB + MOD	23.5%	1.8%	0.0%	0.0%
	WB + NS + MOD	5.9%	26.8%	0.0%	0.0%
	TL + WB + NS + MOD	47.0%	0.0%	0.0%	0.0%
Other options 25^0S – 30^0S	TL + MOD	0.0%	0.0%	0.0%	4.6%
	WB + MOD	23.5%	71.4%	0.0%	0.0%
Other options north of 23^0N	NS + MOD	0.0%	0.0%	0.3%	0.6%
	MOD	0.0%	0.0%	99.7%	94.6%
Total		100.0%	100.0%	100.0%	100.0%

2021	Combination of mitigation measures	Proportion of observed effort using mitigation measures			
		South of 30^0S	25^0S – 30^0S	25^0S to 23^0N	North of 23^0N
Other options north of 23^0N	MOD			100.0%	
Total				100.0%	

[1]TL = tori line, NS=night setting, WB = weighted branch line, SS = side setting, BC = bird curtain, BDB = blue dyed bait, DSLS = deep setting line shooter, MOD = management of offal discharge, HS=hook-shielding device.

Appendix Table 8-1. Number of observed seabird captures in the longliners larger than 20 GRT (approximately >= 24 m), by year, species and area. This table was request written in **paragraph 9 of CMM2017-06**.

2017

Species	South of 30S	23N-30S	North of 23N	Total
Black-browed albatross	1	0	0	1
Black-footed albatross	0	0	16	16
Buller's albatross group	14	0	0	14
Campbell albatross	2	0	0	2
Laysan albatross	0	0	22	22
Masked booby	0	2	0	2
Shy-type albatrosses	4	0	0	4
Southern Buller's albatross	1	0	0	1
Unidentified albatrosses	0	0	25	25
Wandering albatross group3	1	0	0	1
White-chinned petrel	4	0	0	4
Total	27	2	63	92

2018

Species	South of 30S	23N-30S	North of 23N	Total
Black-browed albatross group	4	0	0	4
Black-footed albatross	0	0	18	18
Buller's albatross group	14	0	0	14
Campbell albatross	4	0	0	4
Gibson's albatross	1	0	0	1
Laysan albatross	0	0	43	43
Northern giant petrel	1	0	0	1
Other albatrosses	1	0	0	1
Shy-type albatrosses	5	0	0	5
Sooty shearwater	1	0	0	1
Wandering albatross	1	0	0	1
Wandering albatross group3	1	0	0	1
White-chinned petrel	4	0	0	4
Total	37	0	61	98

Appendix Table 8-2. Number of observed seabird captures in the longliners less than 20 GRT (approximately < 24m), by year species and area. This table was request written in **paragraph 9 of CMM 2017–06**.

2017

Species	23N-30S	North of 23N	Total
Black-footed albatross	0	19	19
Laysan albatross	0	169	169
Streaked shearwater	2	9	11
Unidentified albatrosses	0	18	18
Total	2	215	217

2018

Species	23N-30S	North of 23N	Total
Black-footed albatross	0	15	15
Flesh-footed shearwater	1	0	1
Laysan albatross	0	40	40
Streaked shearwater	6	0	6
Total	7	55	62

Appendix Table 8-3. Number of observed seabird captures in Japan longline fisheries in the longliners larger than 20 GRT (approximately >=24m, by year species and area. This table was request written in **paragraph 13 of CMM 2018–03**.

2019

Species	South of 30S	25S-30S	23N-25S	North of 23N	Total
Black-browed albatross	4	0	0	0	4
Black-browed albatross group	39	0	0	0	39
Black-footed albatross	0	0	1	12	13
Brown booby	0	0	2	0	2
Buller's albatross group	339	0	0	0	339
Campbell albatross	51	0	0	0	51
Gibson's albatross	7	0	0	0	7
Laysan albatross	0	0	0	35	35
Light-mantled albatross	2	0	0	0	2
Northern giant petrel	4	0	0	0	4
Other albatrosses	2	0	0	0	2
Parkinson's petrel	2	0	0	0	2
Red-footed booby	0	0	1	0	1
Shy-type albatrosses	328	0	0	0	328
Southern fulmar	1	0	0	0	1
Southern giant petrel	1	0	0	0	1
Unidentified albatrosses	176	0	0	36	212
Unidentified birds	8	0	0	0	8
Unidentified giant petrels	1	0	0	0	1
Unidentified petrels	36	0	0	0	36
Wandering albatross	18	0	0	0	18
Wandering albatross group2	2	0	0	0	2
Wandering albatross group3	7	0	0	0	7
Wandering albatross group5	10	0	0	0	10
White-chinned petrel	102	0	0	0	102
Total	1140	0	4	83	1227

2020

Species	South of 30S	25S-30S	23N-25S	North of 23N	Total
Buller's albatross group	2	0	0	0	2
Parkinson's petrel	6	0	0	0	6
Shy-type albatrosses	4	0	0	0	4
Wandering albatross	1	0	0	0	1
Total	13	0	0	0	13

2021

Species	South of 30S	25S-30S	23N-25S	North of 23N	Total
Total	0	0	0	0	0

Appendix Table 8-4. Number of observed seabird captures in the longliners less than 20 GRT (approximately < 24m), by year species and area. This table was request written in **paragraph 9 of CMM 2018–03**.

2019

Species	23N-25S	North of 23N	Total
Black-footed albatross	0	82	82
Laysan albatross	0	338	338
Streaked shearwater	1	2	3
Unidentified albatrosses	0	15	15
Total	1	437	438

2020

Species	23N-25S	North of 23N	Total
Laysan albatross	0	28	28
Streaked shearwater	2	0	2
Total	2	28	30

2021

Species	23N-25S	North of 23N	Total
Total	0	0	0

Appendix Table 9. Striped marlin catch for the Japanese offshore and distant water longline fishery in the WCP-CA south of 15˚S. This table was request written in **paragraph 4 of CMM‑2006‑04**

Year	Striped marlin catch (t)
2016	66
2017	30
2018	23
2019	20
2020	26
2021	36

Appendix Table 10-1. Fishing effort and albacore catch for the Japanese offshore and distant water longline and pole-and-line fisheries in the south of 20˚S in the WCP-CA. This table was request written in **paragraph 4 of CMM‑2015‑02**.

(a) Offshore and distant water longline	
Year	Albacore catch (mt)
2016	835
2017	974
2018	608
2019	567
2020	(933)
2021	(689)

(b) Offshore and distant water pole-and-line		
Year	Vessels	Albacore catch (mt)
2016	3	7
2017	2	2
2018	1	39
2019	1	25
2020	(2)	(6)
2021	(0)	(0)

Appendix Table 10-2. Catch (mt) by vessel for the Japanese offshore and distant water longline fishery in the south of 20˚S in the WCP-CA. BIL: other billfishes, SHK: sharks. This table was request written in **paragraph 4 of CMM‑2015‑02**.

Year	Vessel	ALB	BET	YFT	SWO	BIL	SHK
2021	A01	113	7	12	5	4	0
2021	A02	12	0	0	2	0	0
2021	A03	1	0	0	1	0	0
2021	A04	11	4	1	7	0	0
2021	A05	9	1	1	2	0	0
2021	A06	27	17	9	8	9	0
2021	A07	28	1	0	5	1	0
2021	A08	8	1	0	3	0	0
2021	A09	3	0	0	2	0	0
2021	A10	13	0	0	2	0	0
2021	A11	20	6	1	3	1	0
2021	A12	117	6	10	5	4	0
2021	A13	11	1	3	3	1	7
2021	A14	13	0	0	5	0	0
2021	A15	35	22	9	5	2	15
2021	A16	12	12	5	11	2	0
2021	A17	64	13	8	4	3	0
2021	A18	38	12	6	3	3	0
2021	A19	43	1	16	3	2	0
2021	A20	64	30	13	6	4	0
2021	A21	19	0	0	3	0	0

Appendix Table 11-1. Albacore catch by fishery in mt in the WCP-CA north of the Equator. Figures in parentheses indicate provisional data. That was request written in **paragraph 3 of CMM2019-03**.

	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
Year	Coastal	Offshore & distant water	Coastal	Offshore & distant water	Coastal	Offshore & distant water				
2016	13118	3397	33	14402	3	3673	19	148	28	128
2017	13597	3673	30	20861	17	1234	40	107	48	119
2018	10121	3004	119	17756	2	3037	35	78	13	70
2019	7386	2758	177	8331	274	771	9	543	27	95
2020	(10242)	(2421)	(254)	(36384)	(10)	(5951)	(7)	(784)	(25)	(159)
2021	(10521)	(3056)	(254)	(36384)	(10)	(5951)	(7)	(784)	(25)	(159)

Appendix Table 11-2. Fishing effort in fishing days by fishery directed as albacore in the WCP-CA north of the Equator. Figures in parentheses indicate provisional data. NA indicates data not available. That was request written in **paragraph 3 of CMM2019-03**.

	LL	LL	PL	PL	PS	PS	Gillnet	Troll	Setnet	Others
Year	Coastal	Offshore & distant water	Coastal	Offshore & distant water	Coastal	Offshore & distant water				
2016	37308	10419	NA	13923	NA	6616	NA	NA	NA	NA
2017	35668	10154	NA	12797	NA	6766	NA	NA	NA	NA
2018	35037	10126	NA	13439	NA	6920	NA	NA	NA	NA
2019	34231	9987	NA	12321	NA	6927	NA	NA	NA	NA
2020	(35307)	(10278)	NA	(11062)	NA	(5100)	NA	NA	NA	NA
2021	(26516)	(7742)	NA	(12538)	NA	(5688)	NA	NA	NA	NA

Appendix Table 11-3. Fishing effort in number of vessel and vessel days by fishery directed as albacore in the WCP-CA north of the Equator. Figures in parentheses indicate provisional data. NA indicates data not available. That was request written in **paragraph 3 of CMM2019-03**.

CCM	Area	Fishery	2002–04 Average		2019		2020		2021	
			No. of vessels	Vessel days	No. of vessels	Vessel days	No. of vessels	Vessel days	No. of vessels	Vessel days
Japan	WCP-CA north of the Equator.	LL Coastal	266	42292	230	34231	(227)	(35307)	(198)	(26516)
		LL Offshore & distant water	198	22827	68	9987	(62)	(10278)	(54)	(7742)
		PL Coastal	NA	NA	NA	NA	NA	NA	NA	NA
		PL Offshore & distant water	135	18483	74	12321	(67)	(11062)	(64)	(12538)
		PS Coastal	NA	NA	NA	NA	NA	NA	NA	NA
		PS Offshore & distant water	25	4208	14	6297	(14)	(5100)	(18)	(5688)
		Gillnet	NA	NA	NA	NA	NA	NA	NA	NA
		Troll	NA	NA	NA	NA	NA	NA	NA	NA
		Setnet	NA	NA	NA	NA	NA	NA	NA	NA
		Others	NA	NA	NA	NA	NA	NA	NA	NA