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National Report of Japan[1]

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Summary

Japanese tuna fisheries consist of the three major fisheries, i.e., longline, purse seine, pole-and-line, and other miscellaneous fisheries like troll, drift-net, set-net fisheries. These fisheries occupy around 99 % of the total tuna catch of Japanese fisheries in recent years. This paper described the recent trend of the Japanese tuna fisheries in the north Pacific Ocean and updated the statistics given in the previous National Report for ISC11 (Kai et. al., 2011). The total landing of tunas (excluding skipjack) caught by Japanese fisheries in the north Pacific Ocean in 2010 was 107,539 metric ton (t) and that in 2011 was 107,703 t which was similar to the 2010 catch. The total landing of swordfish and billfishes was 6,395 t in 2010 and 5,795 t in 2011 which was 90.6% of the 2010 catch. The landing of skipjack tuna was 189,423 t in 2010 and 147,092 t in 2011 which was 77.6% of the 2010 catch. In addition to fisheries description, a brief description was given on Japanese research activities on tuna and tuna-like species in the Pacific Ocean in 2011 and 2012. Moreover, management and conservation measures for PBF were also described.

1. Trends in fleet size

Table 1A and 1B show the number of Japanese tuna vessels actually engaged in fishing by type of fishery and by vessel size class during 1980-2006 (Anonymous 1982-2011) and 2007-2011. The number of active vessels 2007-2011 was estimated based on logbook data. Therefore some vessels who actuary operated but did not submit logbook were not included. The coastal longline vessels less than 20 Gross Register Tonnage (GRT), and the research and training vessels of longline and pole-and-line are not included in Table 1B. Tables in 2010 and 2011 are provisional in those tables.

The total number of longline vessels shows continuous declining trend since the early 1990s. The number of longline vessels of the largest size class (larger than 200 GRT) was near constant in the period between the late 1960s and the mid-1990s. In accordance with the agreement of the FAO's international action plan on fishing capacity, Japan decreased its large longline vessels by 20% in 1998. The number of longline vessels continued to

decline thereafter. Recent declining trend for larger than 50 GRT are remarkable, the number of vessels of 100-200 GRT was 25 in 2011 which is 48% of that in 2006, and the number of vessels of 50-100 200 GRT was 24 in 2011 which is 55% of that in 2006. This large reduction were mainly derived from high price of fuel especially since 2007 and the fleet reduction program implemented by the Government of Japan in March 2009 according with management measures agreed in the various tuna RFMOs. While the number of vessels for 20-49 GRT and 50-100 GRT showed a sharp decline since the late 1980s, the number of vessels of smallest size class (less than 20 GRT) fluctuated at around 700 during the 1980-2006. The number of vessels of 10-49 GRT was relatively stable, ranging between 253 and 288 during the 2007-2011.

The total number of purse seine vessel was 52 in 2006, and it was nearly 80% of that in the 1980s. The number of the smaller size (smaller than 200 GRT) purse seine vessels has decreased since the late 1980s. The larger vessels which operate mainly in the tropical waters were around 35 and have been stabilized since 1995. There is one purse seine vessel which belongs 200-500 GRT category but operates only in north of 20°N since 1995 and there is the other one vessel since 2009. In contrast to longline and pole-and-line fishery, the number of purse seine vessels was relatively stable in the recent 5 years.

Regarding the pole-and-line fishery, the number of vessels larger than 20 GRT declined to 122 in 2006 from 140 in 2005, which was almost one third of the average in the 1980s. The trend in the number of vessels smaller than 20 GRT also showed the general decreasing trend during the 1995-2006, and the number of vessels in 2006 was 44% of that in 1995. The number of pole-and-line vessels of 50-200 GRT was 62 in 2011 which is 75% of that in 2006. The number of pole-and-line vessels for over 200 GRT also shows declining trend with the lesser extent, is 28 in 2011which is 93% of that in 2006.

2. Catch and effort trends of the major fisheries

The logbook systems have been in place for offshore and distant water longline, pole-and-line, and purse seine fisheries. From 1994, the logbook system was introduced to the coastal longline vessels (10-20 GRT) fishing both within and outside the Japanese EEZ and these vessels were included in the offshore category since 2002. Historical Category II data was compiled from those logbook data and submitted to the ISC Statistics Working Group in July 2011.

There are small scale fisheries in the coastal waters of Japan such as troll and set net which are not covered by the current logbook system. Catches by these fisheries are covered by the landing statistics collected by the Statistics Department, Minister's Secretariat, the Ministry of Agriculture, Forestry and Fisheries (Anonymous 1982-2011).

Catch and effort data used in this paper are mostly based on the logbook data compiled by the National Research Institute of Far Seas Fisheries, Fisheries Research Agency (NRIFSF). The data source of catch for the coastal longline fishery is derived from Statistics Department, Minister’s Secretariat Ministry of Agriculture, Forestry and Fishery (Anonymous 1982-2011). The number of hooks employed for this fishery was not available.

The total landing of tunas (excluding skipjack) caught by Japanese fisheries in the north Pacific Ocean in 2010 was 107,539 metric ton (t) and that in 2011 was 107,703 t which was similar to the 2010 catch. The total landing of swordfish and billfishes was 6,395 t in 2010 and 5,795 t in 2011 which was 90.6% of the 2010 catch. The landing of skipjack tuna was 189,423 t in 2010 and 147,092 t in 2011 which was 77.6% of the 2010 catch.

2.1 Longline

Longline fisheries are classified by the type of license issued by the Government, i.e., coastal (smaller than 20 GRT and can fish only in Japanese EEZ), small offshore (10-20 GRT), offshore (10-120 GRT), and distant water (larger than 120 GRT).

The fishing effort of the distant water and offshore longline vessels remained stable at around 200 million hooks in the North Pacific in the 1980s, and then it decreased continuously to 100 million hooks in the early 2000s, and it has further decreased in the most recent years (Fig. 1). The amount of effort was 46 million hooks in 2011, which is 65% of that in 2007. Annual distribution of fishing effort for longline vessels larger than 20 GRT in 2009, 2010 and 2011 are shown in Fig. 2. In those years, the fishing grounds were located in east-west direction off Japan to Hawaii, equatorial area between 15 ˚S and 15 ˚N, off Australia and off Peru.

Total catch of distant and offshore longline vessels in the north Pacific has been decreased since the highest catch of 119,202 MT in 1980, was 19,453 MT in 2011 which is 16% of that in 1980 (Fig. 1). Bigeye has been the dominant species in this fishery in the north Pacific. The bigeye catch, which was stable in the 1980s and about 50,000 MT in late 1980s, showed a declining trend in the 1990s and decreased to less than 10,000 MT in 2009. Bigeye catch was 8,167 MT in 2011 (Table 2-A). Yellowfin catch ranged between 30,000 MT and 50,000 MT until early 1980s. It has gradually decreased into about 10,000 MT in 2001 and into less than 5,000 MT in 2007. Yellowfin catch was 2,288 MT in 2011 (Table 2-A). Pacific bluefin catch have been fluctuate since 1980s ranging from 313 MT to 4 MT (Table 2-A). Albacore catch which have fluctuated around 10,000 MT until 2001 decreased to about 4,000 MT to 5,000 MT and kept stable at a low level during the period 2003-2011. The catch was 3,820 MT in 2009, which is the lowest since 1980, but the catch slightly increased to 4,497 MT in 2011. The catch of swordfish was 3,182 MT in 2011, and the catch of striped marlin was 308 MT in 2011 (Table 2-A).

The fishing effort of the small offshore longline vessels (10-20 GRT and make operation at out of Japanese EEZ) has been relatively stable at around 70 million hooks in the north Pacific (Table 2-B) and the total catch of tunas and billfishes fluctuated between 29,000 MT and 38,000 MT in the recent years. Albacore is the largest catch among species for this fishery and the albacore catch in this fishery is more than 4 times of that of distant water and offshore longline fishery. Albacore catch was 17,386 in 2011. Catches of bigeye and yellowfin are similar level to those of total of distant water and offshore longline. Bigeye catch was 6,577 MT in 2011 and yellowfin catch was 3,361 MT in 2011. Bluefin tuna catch has fluctuated between 1,000 MT and 2,000 MT during the 2007-2011, and was 904 MT in 2011.

By the coastal longline, bigeye catch ranged between 414 MT and 947 MT during the 2006 to 2010 (Table 2C). Yellowfin catch by this fishery ranged between 1,197 MT and 1,844 MT in this period.

Length frequency distribution for tunas and swordfish caught in the Pacific, which was measured on board or at landing port, is shown in Fig. 3. The length of albacore ranged from 60 to 120 cm in fork length (FL). The length of bigeye and yellowfin had wider ranges approximately from 60 to 200 cm but fish larger than 90 cm formed a dominant part of the catch. The length of the swordfish measured ranged from 50 to 220 cm in eye-fork length.

2.2 Purse seine

There are two types of purse seiners that target tunas in Japan, i.e., single and group purse seine fisheries. The group seiner consists of one purse seiner (100-200 GRT) and one searching vessel and two carrier vessels, and operates in the temperate northwestern Pacific (Fig.5). New type of group seiner launched at March 2005, which consists of one large seiner (300 GRT) than typical size of the purse seiner and one carrier instead of two carriers. The group purse seiner operates in the offshore waters off Japan. The carrier holds fish in chilled water with ice and unloads those catches. On the other hand, the single purse seiner (349-500 GRT) operates mainly in the tropical waters of the central and western Pacific, but seasonally operates in the temperate waters (Fig.5).

The fishing effort of the purse seine in the North Pacific was around 9,000 sets in the late 1980s, and then decreased to about 6,000 sets in 1998 (Fig.4). The fishing effort generally stayed at the level about 4,000-6,000 sets in the last decade. The skipjack catch dominant among species in this fishery, followed by yellowfin. The skipjack catch was about 150,000 MT until 2008, and then decreased to around 90,000 MT in 2011 (Table 3-A,B). Pacific bluefin catch was fluctuated ranging from about 3,000 to 25,000 MT since 1980. In the last 5 years, the Pacific bluefin catch ranged from 3,742 MT in 2010 to 10,221 MT in 2008.

The size of bigeye caught by the purse seine fishery in tropical area ranged from 30 to 90 cm in FL and from 30 to 70 cm (Fig 6). Most of the yellowfin catch was also in the range from 30 to 70cm but there are some fishes larger than 80 cm.

2.3 Pole-and-line

The pole-and-line fishery is composed of three different categories, i.e., coastal (smaller than 20 GRT), offshore (20-120 GRT) and distant water (lager than 120 GRT) vessels in terms of the license of this fishery. Note that some of 19 GRT type vessels obtained offshore license since 2007, those are included into offshore category in this document. The pole-and-line fishery can be categorized into large, middle, and small (sized) vessels which correspond to larger than 300 GRT, 20-300 GRT and less than 20 GRT in vessel size.

The middle-sized vessels generally operate in near shore waters of Japan and their trip is within 10 days. Southern most fishing area for these vessels, in recent years, is near 15˚N, but the important fishing ground is

waters north of 25˚N, around Japan and adjacent areas. These vessels primarily fish skipjack and albacore tunas from spring through autumn off Pacific side of Japan, and also harvest relatively small amount of yellowfin and bigeye. They hold fish in cooled water with ice and unload it as fresh fish. The activity of the small pole-and-line vessels is more or less similar to that of the middle vessels but the area of fishing is limited within the Japanese EEZ, and the trip of these vessels is shorter. On the contrary, the large vessels operate more offshore waters and their trips are for two to three months. Usually they primarily target for albacore from summer through autumn season in the waters north of 20˚N, and skipjack tuna in winter and spring in the waters south of 20˚N. These vessels equip a brine freezer, in which fish caught are immediately stored into a tank filled with cooled brine, and then unloads it as frozen fish.

Generally, fishing effort expressed by poles*days for offshore and distant water pole-and-line fisheries rapidly decreased from around 1,100,000 poles*days in the early 1980s to around 320,000 poles*days in 1991, increased to around 430,000 poles*days in 2000, and then decreased to 280,000 poles*days (Fig. 7). Total (species unspecified) catch for those fisheries rapidly decreased from around 280,000 MT to around 170,000 MT during the 1980s, and then gradually decreased from around 130,000 MT to 100,000 MT until the latest year (Fig. 7).

The catch of albacore for distant water and offshore pole-and-line fisheries in the north Pacific has historically fluctuated in the range between 6,000 and 49,000 MT (Fig.7). The albacore catch was 28,475 MT in 2011 (Table 4-A). The skipjack catch for distant water and offshore pole-and-line fisheries showed decrease trend, from 80,414 MT in 2007 to 58,844 MT in 2011. The skipjack catch for coastal pole and line sharply declined in 2011 (Table 4-B).

Fishing grounds of the pole-and-line fishery are widely spreads ranging from 45˚N and 10˚S, from 120˚E to 170˚W. The fishing grounds were separated by around 25 degree north but more continuous than the purse seine fishing grounds (Fig.5 and 8).

The size of skipjack caught by this fishery is ranged from 40 to 60 cm FL and ranged from 50 to 90 cm for albacore. Several clear modes are obvious (Fig.9).

2.4 Other fisheries

There are miscellaneous small scale fisheries other than the longline, the purse seine and the pole-and-line fisheries, which catch tunas and tuna-like species in the Japanese coastal waters. Among them, the largest catch was made by the troll fishery for which the catch of tunas was 9,942 MT in 2010 (Table5-A). The catch of skipjack for this fishery was the largest among species, and was 4,729 MT in 2010. The catch of set-net fishery was 2,085 MT in 2010(Table5-B).

The large mesh driftnet fishery, that historically expanded its fishing ground covering areas of the temperate North and South Pacific in the 1980s, was suspended in 1991 in the South Pacific and in the high seas of the North Pacific

in 1992 due to UN resolution implemented for this fishery. The catch of tunas for the gillnet fisheries including the large mesh driftnet fishery was in Japanese EEZ was 503 MT in 2010 (Table5-C).

The size data of Pacific bluefin tuna caught by several fisheries is collected at the main fishing ports in Japan. Total number of the size measurement data was 43,029 and 47,161 in 2010 and 2011, respectively.

2.5 Recent trends for Pacific bluefin tuna, albacore and swordfish fisheries

2.5.1. Pacific bluefin tuna

Total annual catch in 2010 was 8,561 MT, the minimum in recent ten years. The total annual catch in 2011, however, increased to 13,338 MT by 4,766 MT. In 2011, decreases of annual catch were seen in the coastal longline, pole-and-line and others fisheries. The annual catch for the coastal longline fishery, main fishery for adult PBF, continued to decrease from 2007 and the catch in 2011, although it was provisional, was approximately half of that in 2008. On the other hand, the catches by the tuna purse seine, small pelagic fish purse seine, troll and set net fisheries had increased in 2011. The increases of catch of the tuna purse seine and small pelagic fish purse seine fisheries, which were 1,072 MT and 3,518 MT, respectively, contributed to the increase of total annual catch. The annual catch in 2011 of the small pelagic fish purse seine fishery that targets age-1 PBF was the fourth highest since 2000.

2.5.2. Albacore

Total catch of albacore in 2011 was 51,513 t, which was about 10,000 t larger than 2010 catch and was nearly equal to average of past 5 years, though the value in 2011 is provisional. Albacore catch by the pole-and-line fluctuated largely, but catch by longline was comparatively stable. Fishing effort by middle class (20-199 GRT) pole-and-line vessels continued to decrease in recent years, whereas that by large (> 200 GRT) vessels fluctuated. Catch by longline in 2011 (21,882 t) was similar to the catch in 2010 (21,882 t). Fishing efforts in recent 5 years by longline fishery (> 20 GRT) were decreasing, whereas the efforts of coastal longline (10-19 GRT) were stable. Trend of nominal longline CPUE differs depending on area, and shows strong declining trend in the first quarter since 2002 in the northeast Pacific.

2.5.3. Swordfish

The catch of the swordfish by Japanese offshore and distant-water longliners shows steady decreasing trend from 6,100 tons in 2007 to 3,200 tons in 2011 (Table 2A). Sudden decrease of the catch in 2011 is caused by the Tsunami disaster. Though most of offshore surface longliners based on Kesennuma fishing port and seasonally targeting swordfish are not damaged by the Tsunami attack, loss of functions of Kesennuma fishing port compelled surface longliners to stop their operations for more than 5 months. The catch by Japanese coastal longliners is also continuously decreased during 2007 – 2010. This supposed to be at least partially caused by the decrease of the number of coastal longline boats (Table 1B). Preliminary report of the year book also informed that the swordfish catch by Japanese coastal large mesh drift net in 2011 is decreased into about 200 tons from 483 tons in 2010. This is because many drift-netters ceased their operations since the Tsunami attack, though more than many of them are

survived from it.

3. Research activities

The Fishery Agency of Japan, in cooperation with the NRIFSF and local prefectural fisheries experimental stations, has run the nationwide port sampling project for collection of catch, effort and size data at the major landing ports since the early 1990s. In addition, there are cooperative works with prefectural fisheries experimental stations and universities. Several cooperative studies are also on going with foreign countries.

3.1. Research cruises

There have been several research cruises in 2011 conducted by the Fisheries Agency of Japan and the NRIFSF relating to tunas and bycatch species in the north Pacific.

3.1.1. Pacific bluefin tuna larvae/juveniles

In 2011, research cruises were conducted for ecological study of larval/juvenile PBF by R/V Syoyo-Maru, Shunyo-Maru, Yoko-Maru, Tenyo-Maru, and six prefectural R/Vs. Larval surveys were conducted in the south of Japan around Nansei Island area, which is a major spawning ground of PBF, from 9 May to 27 July and found that the east of Miyako Islands was the abundant area of PBF larvae. Larval surveys were conducted also in the Sea of Japan, which is another spawning ground of PBF, from 21 June to 11 August and found that PBF larvae were abundant in the area between Oki Islands and Noto Peninsula. This information would be utilized to estimate spawning grounds of PBF by backward Lagrangian trans-port. The previous studies suggest that PBF larvae hatched around Nansei Islands are transported to the Kuroshio Current area as they grow. To elucidate the oceanographic relationship between the distribution of PBF juveniles and the Kuroshio, PBF juveniles were collected nearby Yakushima Island from 14 June through 11 July in 2011 by the pelagic trawls. In total, 112 individuals of PBF juveniles (FL: 30-140cm) were captured mainly in the Kuroshio Current region. The results well correspond to the prediction by the juvenile migration model of PBF, which suggest that some of PBF juvenile migrate across the Kuroshio off-west of Yakushima Island toward the Sea of Japan, while some migrate to the east toward the Pacific coast of Shikoku and Honshu.

3.1.2. Bycatch species

3.1.2.1. Mitigation studies for seabirds

Effectiveness of single tori line and paired tori lines (light streamer type, or long and short hybrid streamer type) was examined using approximately 20 commercial longline vessels in the North Pacific. There were no significant difference in albatross CPUEs between single tori line and paired tori lines. The results suggested that tori line without relation to the number would be effective to reduce the incidental catch of seabirds in the north Pacific.

Effectiveness of combination of mitigation techniques (no tori line, single tori line, paired tori lines, weighted branchline, un-weighted branchline) using Japanese research vessel was examined in the North Pacific from Dec. 2011 to June 2012 The results showed that use of tori line was effective in preventing seabird attacks and incidental catch of seabirds with either weighted or un-weighted branchline.

3.1.2.2. Mitigation studies for sea turtles

Experiment of large circle hooks (Koshina type 4.5-sun similar to foreign type 18/0) on catch rates of target species and sea turtles are on the way through operations of commercial longline in the North Pacific 2011. The use of circle hooks is effective to reduce incidental catch or deep hooking of sea turtles. Most of sea turtles caught by shallow longlines were retrieved alive. The result indicates that careful live retrieval and release is effective in improving the post-hooking survival of hooked sea turtles.

3.2. Tagging study

The tagging using conventional tag has been conducted by research and training vessels as well as commercial vessels. Some of these activities are opportunistic tagging. In addition to the conventional tagging, tagging studies using the archival and popup tags have been conducted for tuna and tuna-like species.

3.2.1. Skipjack

Three research/training pole-and-line vessels were involved in the skipjack tagging in 2011. The tagging was conducted in a wide area of western Pacific ranging from 12˚N to 34˚N, from 132˚E to 154˚E. Total of 734 skipjack were released with conventional tag in 2011, and 32 were recovered to date. By one of above vessels, collaborative study of archival tagging with NRIFSF was conducted in the south off Japan (around 18-24˚N, 130-139˚E) in early 2011 and 2012. A total of 162 archival tags (Lotek LAT2510 or LAT2910) were deployed, and to date 5 fish were recaptured, of which archival tags from 4 fish were recovered.

Large scale skipjack tagging was conducted using chartered offshore pole-and-line vessel in the south off Japan (around Ogasawara Islands, 23-27˚N, 135-141˚E) between February and March 2012. Main objective of this study is to investigate migration to the fishing grounds around Japan. A total of 3,308 skipjack tuna (mainly 35-45cm FL) including 109 fish with archival tag (LAT2910) were released. To date 95 fish including 4 fish with archival tag were recaptured.

In addition, skipjack tagging in the coastal area of southwestern Japan, which is being conducted in cooperation with Ajinomoto Co., Inc. (Japanese food and chemical corporation), started in 2009. Main objective of this study is to investigate migration to the Pacific coast of Japanese water (mainly western part of Japan) along the Kuroshio Current. The fish caught around Yonaguni Island (around 24˚N, 123˚E) by coastal troll vessels were tagged and released in 2011 and early 2012. A total of 3,542 skipjack tuna (mainly 35-45cm FL) including 168 fish with archival tag (LAT2910) and 394 fish with dummy archival tag were released. So far 24 fish including 4 fish with archival tag were recaptured mainly around Nansei Islands.

3.2.2. Shark

Japan, however, has been attached traditional tags on sharks by-caught in the variety of research cruises including those by training vessels so far, no traditional tag attachments are conducted in 2011. Instead, variety of biological

sampling, such as collection of sexed size data and aging samples were conducted. In addition, two P-SAT tags were attached on shortfin mako sharks caught by Japanese training vessels in the north Pacific in 2012.

3.2.3. Pacific Bluefin tuna

Natural and fishing mortality of juvenile PBF in the off Kochi prefecture will be investigated using conventional tagging. Juvenile PBF with temperature-depth recorder/archival tag attached to their second dorsal fin/visceral cavity will also be released to determine their habitat utilization. They are expected to provide valuable information on the design of reliable recruitment monitoring survey and the precise estimation of recruitment abundance levels as well as biology of juvenile PBF.

3.3. Recruitment monitoring survey of PBF

Troll survey on age-0 PBF in Tosa bay

NRIFSF targets to develop techniques for timely-monitoring of recruitment strength of age-0 PBF in order to accomplish management of this species. Age-0 PBF migrate to Tosa bay after early July and are caught by troll fishery for farming. Consequently, abundance of age-0 fish in Tosa bay has potential to provide quick estimation on recruitment abundance of age-0 fish. Troll survey, fishery-independent survey, was started in the summer of 2008 as collaborative research of NRIFSF and Kochi Prefectural Fisheries Experimental Station and deployed in Tosa bay. This survey aims to gain abundance index of age-0 PBF that migrates to Tosa bay during summer. In this survey, fixed lines are set in Tosa bay and two chartered fishing boats track the lines with trolling. This survey provides number of fish caught or number of fishing per unit distance (e.g. nautical mile), which is expected to be available as the abundance index, and knowledge on distribution pattern of age-0 PBF in coastal area.

Furthermore, a monitoring survey of fishing boat of troll fishery targeting age-0 PBF had been started in Tosa bay and water areas around Goto and Tsushima in Nagasaki since the summer of 2011. Purpose of this survey is 1) to provide information on positions and water temperature of fishing ground and 2) to measure actual fishing effort such as searching distance or time in order to obtain information on the recruitment strength from commercial fishery. In this survey, data loggers, which can collect information on location and sea temperature at a certain interval and include species and number of fish caught during operation, are equipped on 14 and 10 fishing boats in Tosa bay and Nagasaki, respectively.

4. Approaches for management of PBF

Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries, the Government of Japan has commenced measures to strengthen the management of PBF stock since April 1st 2011. These measures are for purse seine and coastal fisheries.

Managements for purse seine fisheries targeting PBF operated by fishing vessels of 40 GRT or more are currently were set as follows:

- ✓ Voluntarily restricting annual catch at less than 4,500 metric ton for the small pelagic fish purse seine fishery

catching juvenile PBF less than 30kg in body weight which operates in East China Sea and Sea of Japan,

- ✓ Voluntarily restricting annual catch at less than 2,000 metric ton for the tuna purse seine fishery catching matured PBF of 30 kg or more in body weight which operates in Sea of Japan during the period between July and August when spawning occurs in this water area.
- ✓ Voluntarily restricting annual catch at less than 500 metric ton of juvenile PBF less than 30kg in body weight for the tuna purse seine fishery operated in water areas off Pacific coast of Japan.

The first and third measures were introduced in response to the Conservation and Management Measure (CMM) for Pacific bluefin tuna adopted in the plenary meeting of Western and Central Pacific Fisheries Commission (WCPFC) held in December 2010 (Anonymous 2010). On the other hand, the second measure was carried out as an additional management measure.

The coastal fishery for PBF that mainly consisted of small-scale troll fishery is open-accessible fishery. With a view to introduce a limit on number of fishing boats engaged in the coastal fisheries in future, the Fishery Agency has started a registration system for the fishing vessels harvesting PBF with powered fishing boats less than 10 GRT and operating in Sea of Japan and the water on the western side of Kyusyu since April 1st in 2011. The registered vessels are required to report at fishing port where they have unloaded PBF catch, fishing gear, area of operations and catch amount of PBF on a month-by-month basis. Thus registration system with the mandatory reporting will be due in 2012 in the waters on the Pacific side of Japan is due to be applied in 2012.

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Table 1A. Number of Japanese tuna fishing vessels operated in the Pacific Ocean by type of fisheries and vessel size based on Anonymous (1982-2011).

	Longline fishery[*1]						Purse seine fishery			Pole-and-line fishery					
Year	1-19 GRT	20-49 GRT	50-99 GRT	100-199 GRT	200- GRT	Total	50-199 GRT[*2]	200- GRT	Total	1-19 GRT[*3]	20-49 GRT	50-99 GRT	100-199 GRT	200- GRT	Total
1980	821	57	715	103	645	2,341	50	16	66	3,232	14	350	10	198	3,804
1981	774	55	706	100	661	2,296	50	23	73	3,064	10	353	6	179	3,612
1982	722	43	634	90	589	2,078	52	33	85	3,011	11	320	6	138	3,486
1983	561	38	589	93	550	1,831	59	36	95	3,021	12	297	9	116	3,455
1984	523	32	538	108	610	1,811	54	33	87	2,904	8	273	10	105	3,300
1985	620	28	512	131	628	1,919	47	35	82	2,754	8	244	9	95	3,110
1986	536	25	435	168	632	1,796	53	38	91	2,455	6	224	9	91	2,785
1987	661	23	348	197	649	1,878	47	34	81	2,404	6	210	9	89	2,718
1988	586	21	289	233	649	1,778	48	39	87	2,613	5	191	11	70	2,890
1989	650	20	248	238	653	1,809	43	37	80	2,254	3	187	12	67	2,523
1990	685	21	227	241	664	1,838	43	35	78	2,228	4	176	9	66	2,483
1991	768	19	199	222	682	1,890	38	35	73	2,277	3	166	10	63	2,519
1992	793	19	164	206	681	1,863	31	38	69	2,093	3	156	11	46	2,309
1993	790	18	138	201	682	1,829	27	36	63	1,927	3	147	10	43	2,130
1994	819	21	110	198	675	1,823	23	33	56	1,830	3	124	10	48	2,015
1995	738	20	92	187	667	1,704	20	31	51	481	3	104	20	46	654
1996	711	17	91	155	640	1,614	21	32	53	512	3	89	29	43	676
1997	698	11	88	145	631	1,573	20	35	55	436	2	76	39	45	598
1998	712	11	80	129	623	1,555	20	35	55	382	2	73	40	46	543
1999	703	6	78	119	567	1,473	22	36	58	416	1	62	54	46	579
2000	732	3	76	111	496	1,418	23	37	60	357	1	56	57	47	518
2001	777	4	76	110	494	1,461	19	36	55	285	1	49	59	47	441
2002	780	4	69	110	484	1,447	18	36	54	251	1	45	58	48	403
2003	764	3	64	99	460	1,390	17	36	53	292	1	44	56	44	437
2004	702	2	55	77	455	1,291	17	36	53	284	1	38	57	43	423
2005	694	2	46	59	432	1,233	17	36	53	247	1	36	58	45	387
2006	709	1	43	54	401	1,208	16	36	52	213	1	27	58	36	335

[*1] Longline vessels larger than 50 GRT include those operated in the area other than the Pacific
[*2] 50-199 GRT class vessels only include those operated in the Pacific side of northern Japan.
[*3] 1–19 GRT class vessels before 1995 include those engaged in trolling

Table 1B. Number of Japanese tuna fishing vessels operated in the North Pacific Ocean by type of fisheries and vessel size based on logbook. Value in 2011 is provisional.

	Longline fishery					Purse seine fishery				Pole-and-line fishery			
Year	10-49 GRT	50-99 GRT	100-199 GRT	200- GRT	Total	50-199 GRT	200-499 GRT	500- GRT	Total	20-49 GRT	50-199 GRT	200- GRT	Total
2007	279	42	48	89	458	35	35	1	71	1	77	29	107
2008	277	42	40	90	449	37	35	1	73	1	69	29	99
2009	277	38	33	81	429	35	34	3	72	1	68	28	97
2010	288	29	28	95	440	33	33	4	70	1	66	28	95
2011	253	24	25	96	398	39	33	4	76	0	62	28	90

Table 2. Fishing effort (number of hooks in thousands) and catch in weight (MT) by species by longline vessels categories in the North Pacific. The values in table A and B are derived from logbook data and former is raised and latter is un-raised statistics. Values in table C are derived from Anonymous (2006-2010). PBF: Pacific bluefin, ALB: albacore, BET: bigeye, YFT: yellowfin, SWO: swordfish, MLS: striped marlin, BUM: blue marlin, BLM: black marlins, SFA: sailfish, SSP: shortbill spearfish and SKJ: skipjack. Value in 2011 in tables A and B is provisional.

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

Year	#hooks	PBF	ALB	BET	YFT	SWO	MLS	BUM	BLM	SFA	SSP	Total
2007	70,464	83	4,017	13,522	3,040	6,109	306	914	12	7	32	28,042
2008	61,555	19	5,415	10,590	2,798	4,402	390	929	11	8	47	24,609
2009	46,483	8	3,820	8,738	2,347	4,400	166	729	10	6	22	20,246
2010	46,155	4	3,890	7,712	2,573	4,235	185	964	8	20	29	19,620
2011	45,524	-	4,497	8,167	2,288	3,182	308	934	7	17	53	19,453

B. Small offshore (10-20 GRT) longline

Year	#hooks	PBF	ALB	BET	YFT	SWO	MLS	BUM	BLM	SFA	SSP	Total
2007	75,623	1,058	18,364	10,650	3,629	2,014	860	1,102	17	14	0	37,708
2008	69,421	2,004	13,677	9,003	3,105	1,785	609	1,147	21	20	0	31,371
2009	74,306	1,476	18,175	8,494	3,419	1,601	621	1,091	14	25	1	34,917
2010	78,267	1,304	17,277	7,166	5,180	1,129	820	1,459	16	42	0	34,393
2011	59,712	904	17,386	6,557	3,361	785	720	949	10	27	1	29,195

* Catches of ALB, SWO and MLS include the catch by coastal longline

C. Coastal (-20 GRT) longline

Year	PBF	ALB	BET	YFT	SWO	MLS	BUM+BLM	SKJ
2006	-	-	699	1,197	-	-	105	11
2007	-	-	947	1,383	-	-	106	7
2008	-	-	610	1,418	-	-	168	14
2009	-	-	499	1,281	-	-	241	6
2010	-	-	414	1,844	-	-	164	7

Table 3. Fishing effort (Number of set) and catch in weight (MT) by species of the Japanese purse seine fisheries in the north Pacific. SKJ: skipjack, YFT: yellowfin, BET: bigeye, PBF: Pacific bluefin, ALB: albacore. Value in 2011 is provisional.

A. Distant water and offshore purse seine

	Sets	SKJ	YFT	BET	PBF*	ALB	Total
2007	5,450	149,069	11,474	3,164	6,840	5,679	176,225
2008	5,567	146,610	13,366	2,746	10,221	824	173,766
2009	5,364	119,813	16,012	1,560	8,077	2,064	147,525
2010	5,090	109,874	11,313	956	3,742	305	126,189
2011	5,242	85,887	12,322	1,609	8,331	305	108,454

* The catch of PBF includes the catch by coastal purse seine

B. Coastal purse seine

	SKJ	YFT	BET	PBF*	ALB	Total
2006	564	23	52	-	28	667
2007	715	18	12	-	3	748
2008	364	59	4	-	1	428
2009	515	30	0	-	12	557
2010	2,361	50	32	-	27	2,470

Table 4. Fishing effort (Number of poles·days) and catch in weight (MT) by species of Japanese pole-and-line fisheries in the north Pacific. SKJ: skipjack, ALB: albacore, YFT: yellowfin, PBF: Pacific bluefin, BET: bigeye. Value in 2011 is provisional.

A. Distant water and offshore pole and line

	Poles*days	SKJ	ALB	YFT	PBF*	BET	Total
2007	316,059	80,414	37,768	2,293	236	1,790	122,501
2008	294,947	77,737	19,060	2,478	64	1,444	100,783
2009	284,809	53,148	31,172	3,517	50	1,400	89,287
2010	290,746	71,289	21,757	2,649	83	2,086	97,864
2011	240,257	58,844	28,475	2,429	63	2,079	91,890

* The catch of PBF includes the catch by coastal pole-and-line (less than 20 GRT vessels)

B. Coastal pole and line

	SKJ	ALB	YFT	PBF*	BET	Total
2006	6,213	78	1,650	-	75	8,016
2007	8,026	104	1,189	-	173	9,492
2008	8,651	35	954	-	127	9,767
2009	8,609	91	1,494	-	151	10,345
2010	2,361	27	50	-	32	2,470

Table 5. Catch in weight (MT) by species of Japanese miscellaneous small scale fisheries other than the longline, the purse seine and the pole-and-line fisheries, which catch tunas and tuna-like species in the Japanese coastal waters. SKJ: skipjack, YFT: yellowfin, BET: bigeye, PBF: Pacific bluefin, ALB: albacore. Value in 2011 is provisional.

A. Troll fishery

	SKJ	YFT	BET	PBF	ALB	Total
2006	3,624	2,262	101	1,544	460	7,991
2007	3,249	2,297	124	2385	519	8,574
2008	4,178	2,436	138	2074	549	9,375
2009	3,819	2,534	115	1875	410	8,753
2010	4,729	3,167	157	1301	588	9,942

B. Set-net fishery

	SKJ	YFT	BET	PBF	ALB	Total
2006	330	18	0	1,421	55	1,824
2007	535	53	1	1,503	30	2,122
2008	315	94	3	2,358	101	2871
2009	274	86	5	2,236	33	2,634
2010	333	103	4	1,603	42	2,085

C. Gillnet fishery

	SKJ	YFT	BET	PBF	ALB	Total
2006	311	13	11	313	221	869
2007	480	16	3	144	226	869
2008	332	23	13	276	1,531	2,175
2009	324	12	7	103	149	595
2010	315	22	2	140	24	503

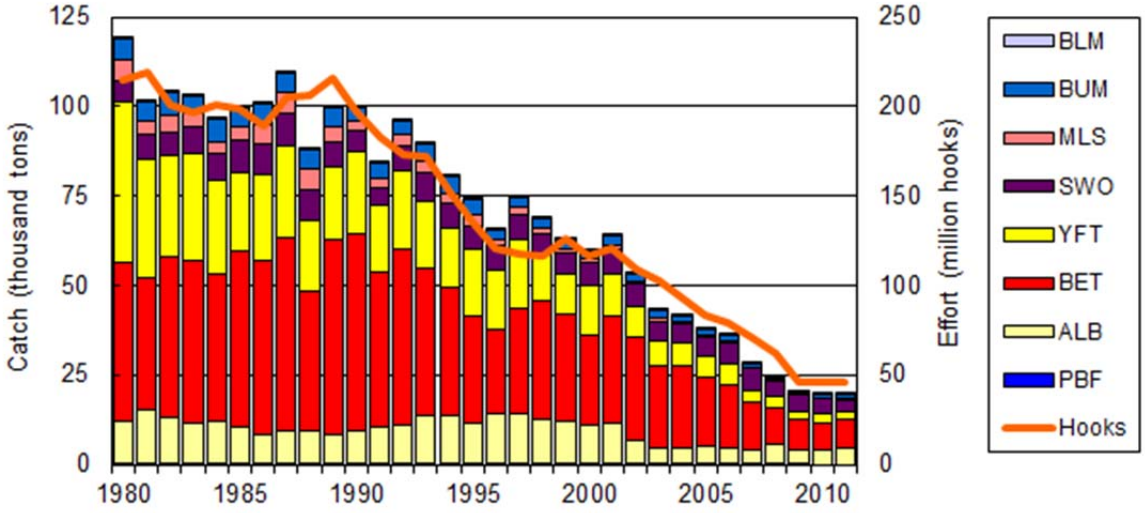

Fig. 1. Historical catches in weight (MT) for major species for the Japanese distant water and offshore longline fishery (not including small offshore) in the North Pacific Ocean and fishing effort (Number of hooks in million) in the North Pacific Ocean comparing to all oceans and whole Pacific Ocean and. ALB: albacore, BET: bigeye, YFT: yellowfin, SWO: sword fish, MLS: striped marlin, BUM: blue marlin.

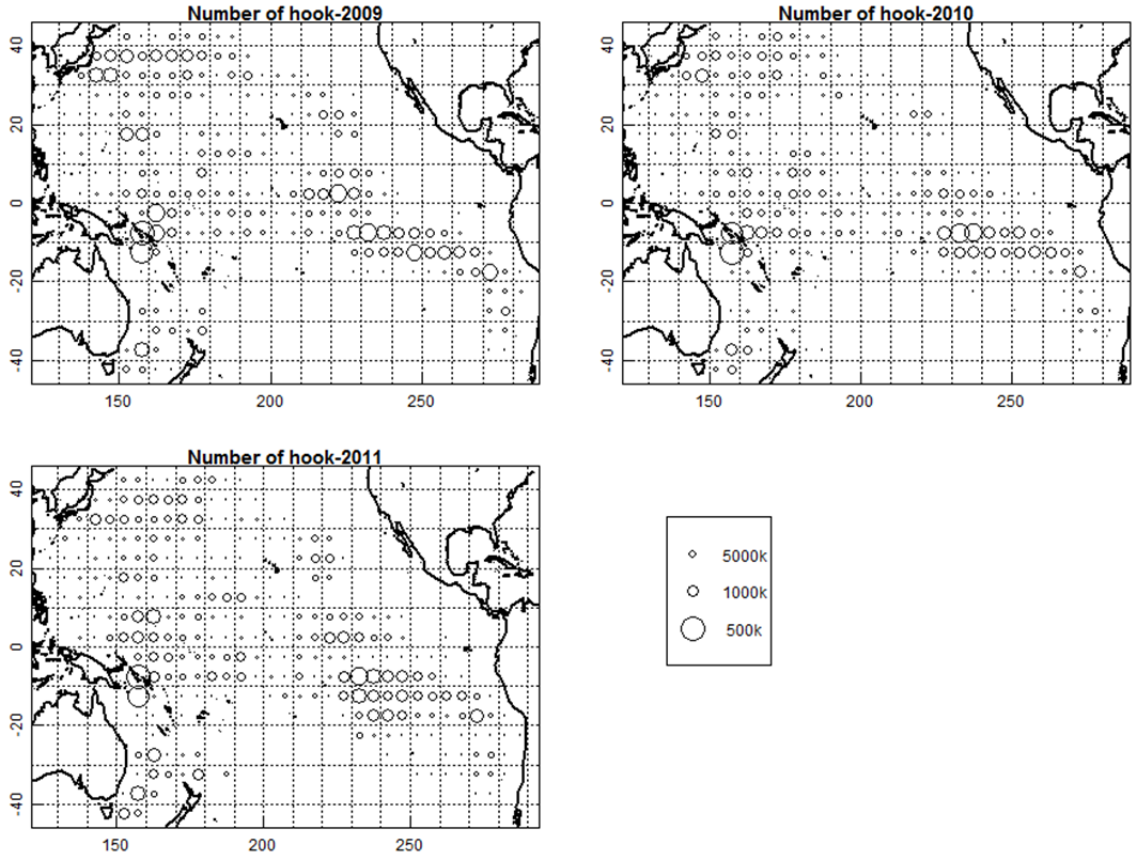

Fig. 2. Distribution of fishing effort (Number of hooks) for the Japanese longline fishery (larger than 20 GRT vessels) in the Pacific, 2009-2011.

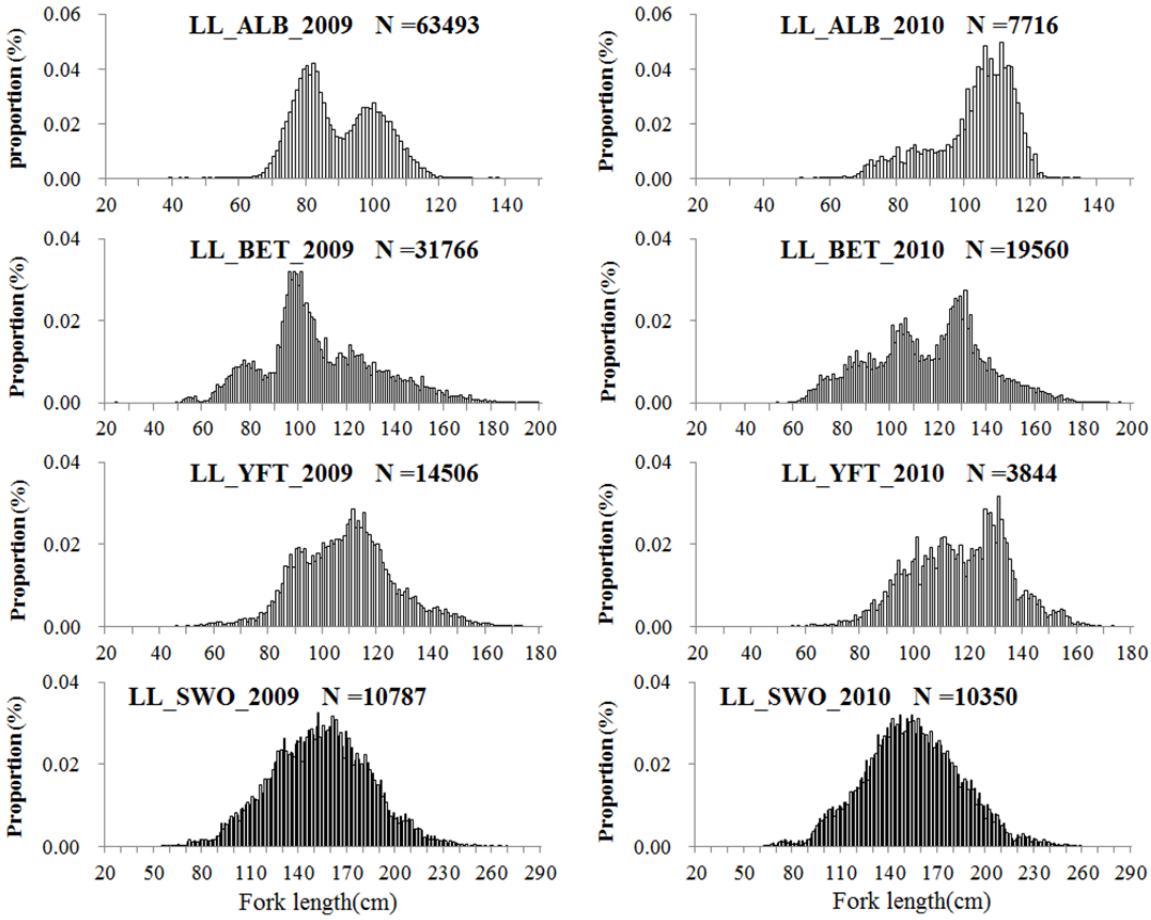

Fig. 3. Annual length frequency distribution (simply summing up all measurements) for longline caught albacore, bigeye, yellowfin, and swordfish in 2009 (left) and 2010 (right). The fork length of the swordfish means eye-fork length. Texts in each graph indicate gear, species, year, and the number of fish measured.

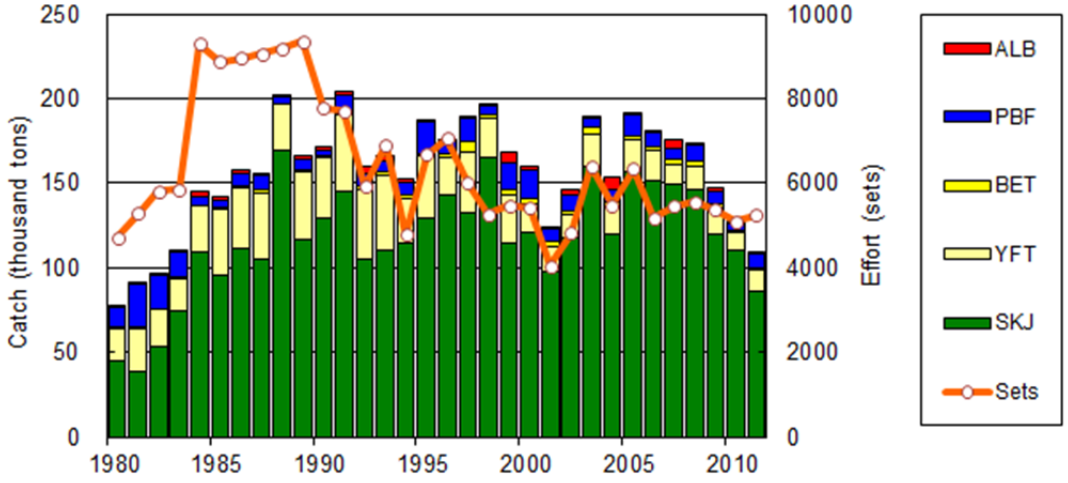

Fig. 4. Historical catches in weight (MT) for major species for the Japanese purse seine fishery and fishing effort (Number of sets) in the Pacific Ocean. SKJ: skipjack, YFT: yellowfin, BET: bigeye, PBF: Pacific bluefin, ALB: albacore. Value in 2011 is provisional.

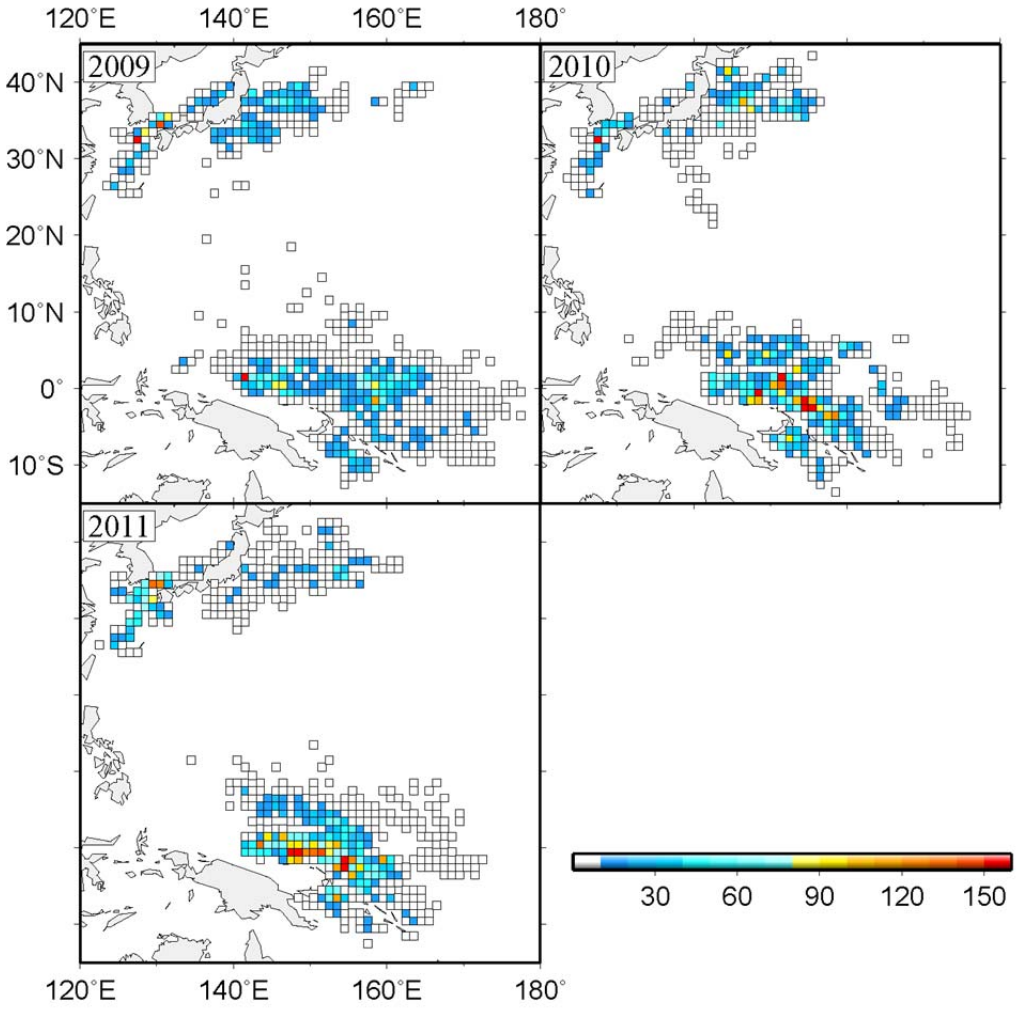

Fig. 5. Distribution of fishing effort (number of sets) for the Japanese purse seine fishery in the Pacific, 2009-2011.

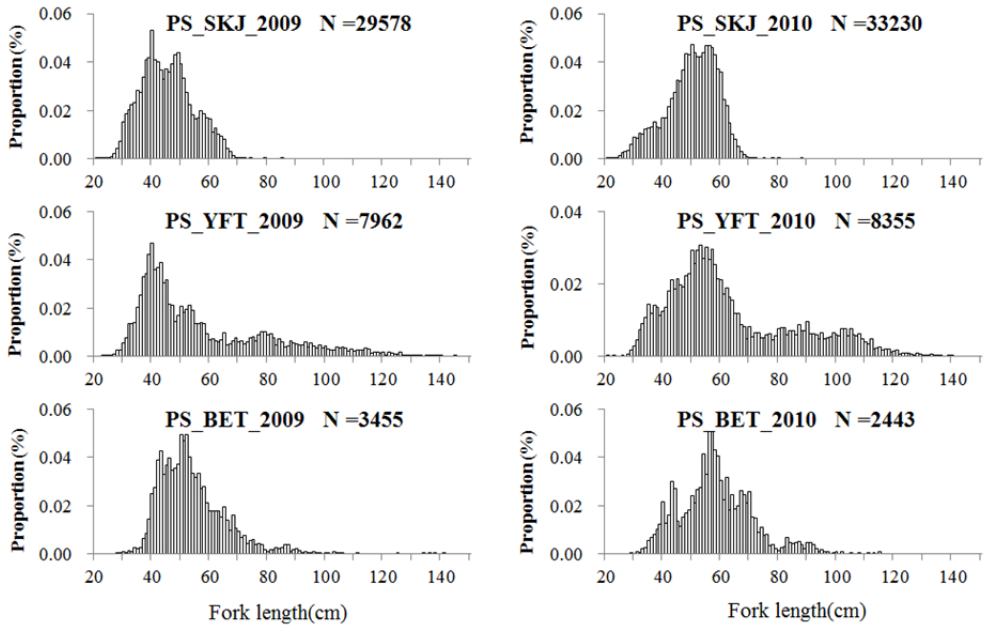

Fig. 6. Annual length frequency distribution (simply summing up all measurements) for distant water purse seine caught skipjack, bigeye, and yellowfin in 2009 (left) and 2010 (right). Texts in each graph indicate gear, species, year, and the number of fish measured.

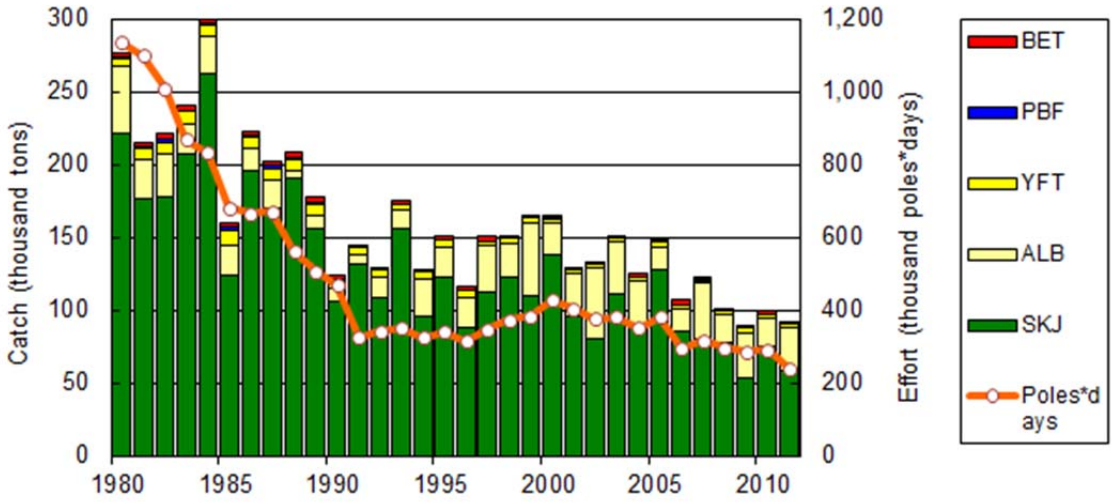

Fig. 7. Historical catch in weight (MT) by species and fishing effort (Number of poles·days) of Japanese distant water and offshore fisheries in the north Pacific. SKJ: skipjack, ALB: albacore, YFT: yellowfin, PBF: Pacific bluefin, BET: bigeye. Value in 2011 is provisional. The catch for PBF includes the catch by coastal pole-and-line (less than 20 GRT vessels) fishery.

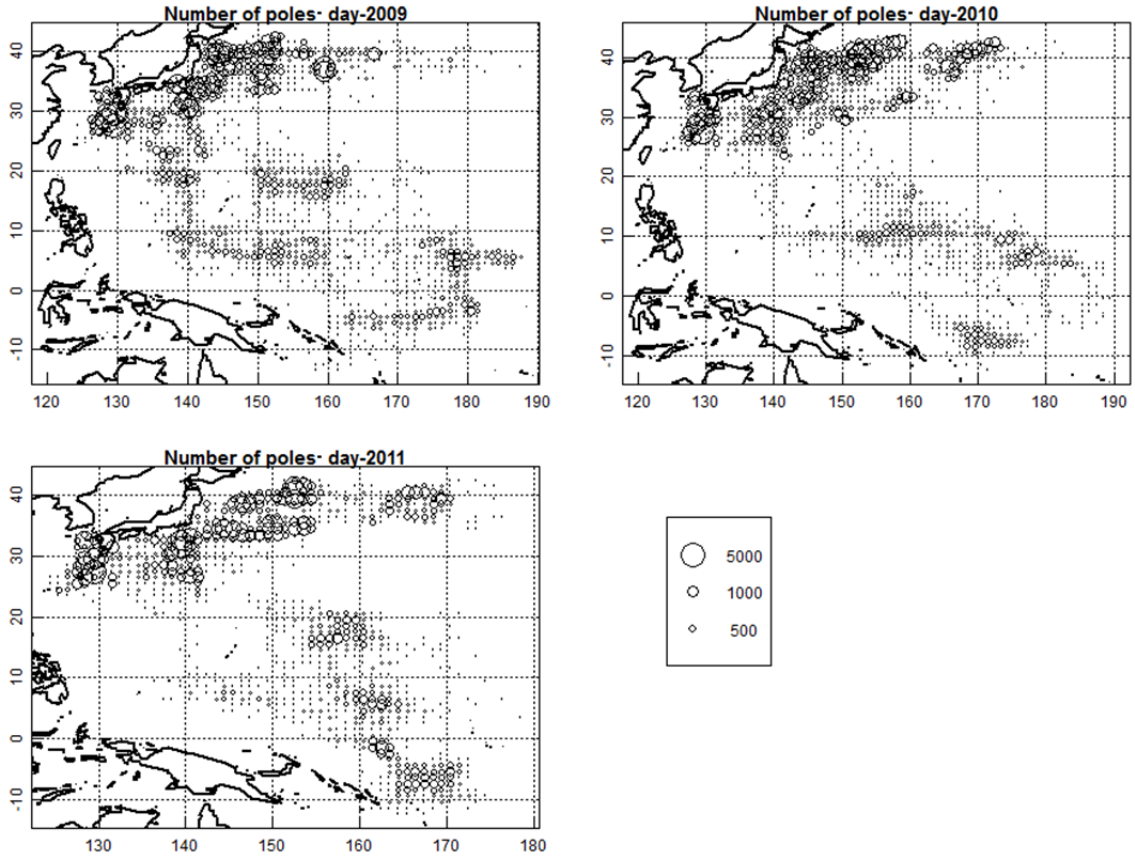

Fig. 8. Distribution of fishing effort (number of poles·days) of the Japanese pole-and-line fishery (larger than 20 GRT vessels) in the Pacific, 2009-2011.

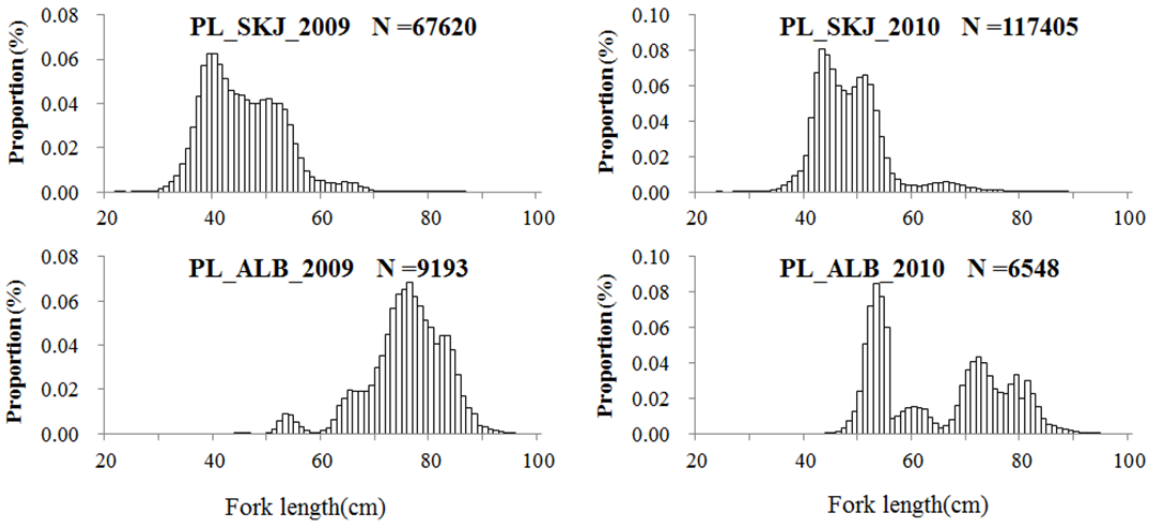

Fig. 9. Annual length frequency distribution (simply summing up all measurements) for distant water and offshore pole-and-line caught skipjack and albacore in 2009 (left) and 2010 (right). Texts in each graph indicate gear, species, year, and the number of fish measured.